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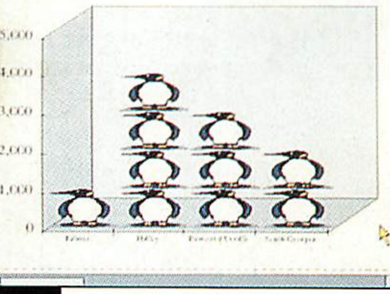
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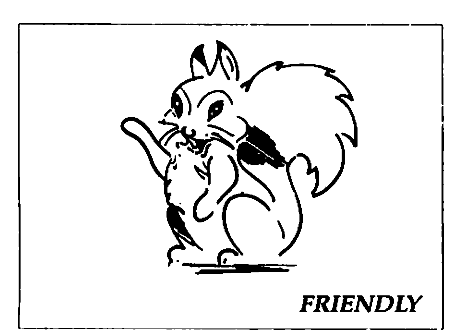
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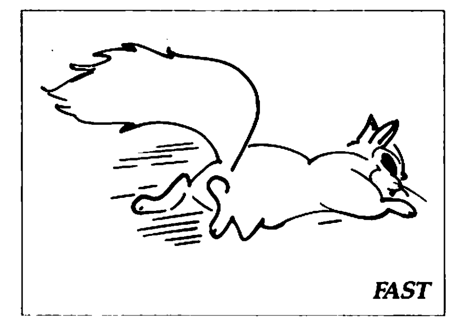
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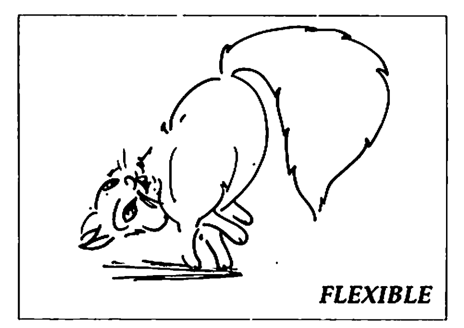
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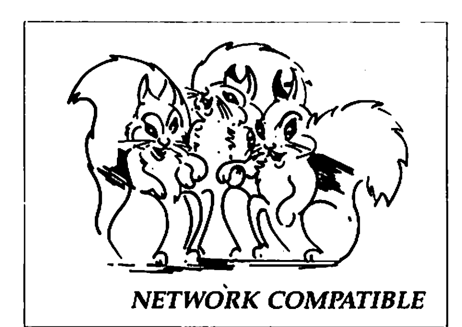
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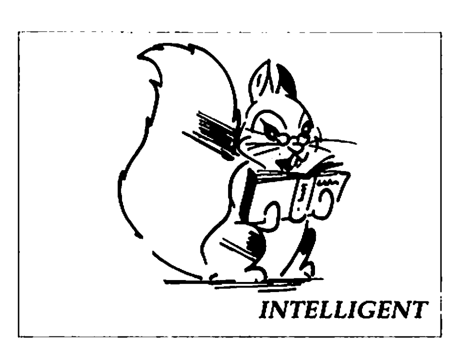
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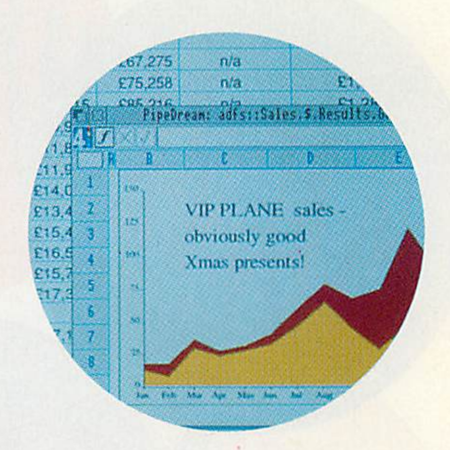
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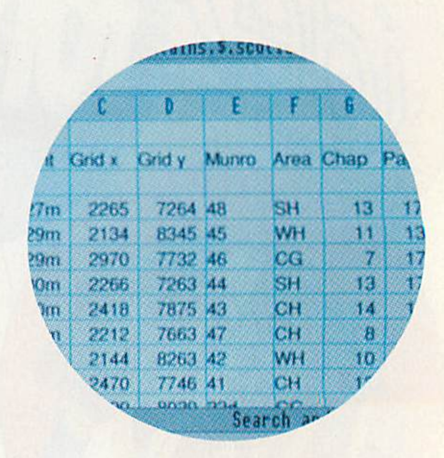
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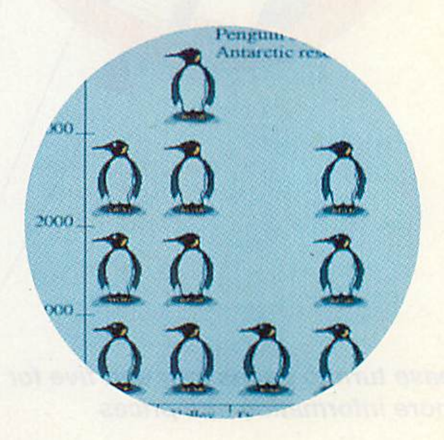
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ISSUE 116

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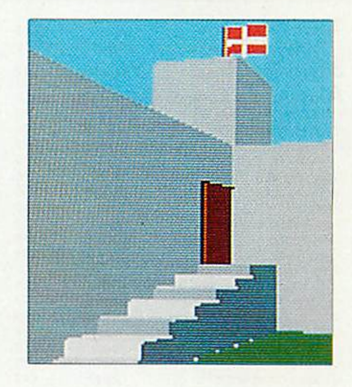
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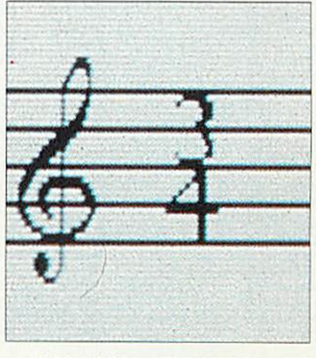
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ScreenPlay	*Widgit*	£35
Screen Turtle	*Topologika*	£36
Seashore Guide, drawfiles	*Micro Studio*	£16
Sesame Street	*Electric Crayon*	
– Letters for You		£16
– Numbers Count		£16
SFXM	*CIS*	£34
ShapeFX	*Data Store*	£10
ShareHolder	*Silicon*	£139
ShowPage	*CC*	£127
Shylock Gnomes, age 10-15	*Selective*	£16
Sigma Sheet	*Minerva*	£38
SkyHunter	*Longman*	£23
smArt	*4mation*	£50
smArt Dinosaurs / Faces / Fashion / Heraldry / Homes / Leisure / Trees and Gardens – each	*4mation*	£15
smArtFiler	*4mation*	£32
Snippet	*4mation*	£26
SolidCAD	*Silicon*	£115
SolidsRender	*Silicon*	£115
SolidTools	*Silicon*	£269
Spark	*David Pilling*	£5
Sparkle	*Morley*	£59
Special	*ICS*	£10
– site licence		£30
Speech!	*Superior*	£14
Spelling week-by-week	*Chalksoft*	£19
Spitfire Fury	*Fourth Dim*	£POA
Splice	*Ace*	£22
Sporting Triangles	*CDS*	£20
Square Route	*Computer Eyes*	£16
Step by Step Guides (videos):	*Pedigree*	
1 Up & Running, 2 Text Processing, 3 Data Handling, 4 Art & Graphics	each	£12
Stock Management	*Minerva*	£78
Studio24Plus Version 2, age 11+	*EMR*	£139
Studio24Plus Version 3, age 12+	*EMR*	£210
Super-Dump	*Silicon*	£20
Superior Golf	*Superior*	£14
Super-Plot	*Silicon*	£28
Supersounds	*CIS*	£15
Supersounds 2	*CIS*	£12
System Delta Plus II	*Minerva*	£50
– Reference Guide	*Minerva*	V0 £25
Tactic	*Eterna*	£15
Talisman	*Minerva*	£12
Target Maths	*Triple R*	£14
TechWriter	*Icon*	£245
Telling the Time, age 3-12	*Rainbow*	£7
Thundermonk	*Minerva*	£12
Timetabler	*Minerva*	£549
TimeWatch	*Mitre*	£24
Tiny Logo + Tiny Draw	*Topologika*	£27
Toolkit Plus	*Clares*	£35
Tools Graphics, drawfiles	*Micro Studio*	£23
Touch Type	*Iota*	£40
Tower of Babel	*Cygnus*	£17
Tracer	*Midnight*	£46
Tracker	*Serial Port*	£37
Transport, drawfiles	*Micro Studio*	£25
Trivial Pursuit	*Domark*	£22
Turbo Type	*CIS*	£20
Tween	*Ace*	£20
Twin	*Acorn*	£24
Twin World	*UBI Soft*	£14
TWO (Task and Window Organiser)	*ICS*	£19
– site licence		£60
U.I.M	*Fourth Dim*	£23
Utility Disc 1	*Data Store*	£13
Utility Disc 2	*Data Store*	£13
Utility Disc 3	*Data Store*	£7
Utility Collection	*Data Store*	£21

View-Mac 3	*Human*	£65
– Arc/Mac Cable	*Human*	£24
Vox Box	*Clares*	£47
White Magic	*Fourth Dim*	£14
White Magic 2 + Designer	*Fourth Dim*	£14
Wimp Game	*Fourth Dim*	£12
Wonderland	*Virgin*	£24
Words and Pictures	*Chalksoft*	£17
World Championship Boxing Manager	*Krisalis*	£20
World Geography Maps, drawfiles	*Micro Studio*	£23
World Map Study, age 7-16	*EMR*	£42
WorldScape	*Eclipse*	£15
World Wildlife, sprites	*Micro Studio*	£16
Worra Battle	*Oak*	£13
WorraCAD	*Oak*	£75
Worra Plot	*Oak*	£24
X-Fire	*Fourth Dim*	£17
Z88: A Dabhand Guide	*Dabs*	V0 £15
Z88 PipeDream Guide	*Dabs*	V0 £15
Zarch	*Superior*	£14
Zelanites	*Micro Power*	£14

HARDWARE

A5000 COMPUTERS

2Mb Hard Disc Colour System	*Acorn*	£1499
– as above + Learning Curve		£1530

(Finance & special purchase schemes available)

MEMORY

Fitting extra unless otherwise stated
† Fitting easy ‡ Fitting needs expertise

A3000 2 Mb Non-upgradable †	*IFEL*	£55
A3000 2 Mb Upgradable †	*IFEL*	£63
A3000 4 Mb †	*Atomwide/IFEL*	£149
A310 2 Mb Upgradable soldered ‡	*IFEL*	£99
– as above + MEMC1a		£149
– as above + MEMC1a + fitting		£200
A310 4 Mb soldered + MEMC1a ‡	*IFEL*	£225
– as above + fitting		£277
– as above + fitting + OS3 carriers		£298
A5000 2 - 4 Mb Upgradable †	*Atomwide*	£109
A5000 2 - 8 Mb including fitting	*Atomwide*	£500
A5000 4 - 8 Mb including fitting	*Atomwide*	£391
A540 4 Mb †	*Atomwide*	£268

MISCELLANEOUS

4-slot 4-layer Backplane	*IFEL*	£59
9060S Monitor	*Eizo*	£450
9070S Monitor	*Eizo*	£640
A300/400 Fan kit	*ICS*	£15
A310 RISC OS Carrier Board ‡	*IFEL*	£25
ARM3 ‡	*Atomwide*	£249
Clares Micro Mouse	*Clares*	£26
Dongle Dangle with screw fittings	*ICS*	£6
Fan filters (pack of 10)	*ICS*	£4
FaxPack	*CC*	£289
Monitor Stand for A3000	*ICS*	£18
Whisper Fan Quietener	*ICS*	£15

HIGH DENSITY 3½" FLOPPY DISCS

Pack of 10		£10

PRINTERS

ArcLaser	*Calligraph*	£895
ArcServer	*Calligraph*	£985
Bubble Jet BJ-10e	*Canon*	£205
Bubble Jet BJ-300	*Canon*	£360
Bubble Jet BJ-330	*Canon*	£405
Laser Direct HiRes4 with 50-sheet tray	*CC*	£895
– with optional 250-sheet cassette		£999
Laser Direct HiRes8	*CC*	£1280
Laser Direct LBP-4 Card	*CC*	£319
Laser Direct Qume	*CC*	£799
LBP-4	*Canon*	£659
Refill toner cartridge for Canon EPS		£50
New toner cartridge for Canon LBP-4		£59

SCANNERS, DIGITISERS

ArcScanner including Epson GT-4000	*Clares*	£1660
FaxScan	*Spacetech*	£94
FX9600AT + Maintenance	*Amstrad*	£376
Hawk V9	*Wild Vision*	£199
– A3000 version	*Wild Vision*	£278
Image (colour)	*Irlam*	£589
Image Scanner	*Iota*	£389
– Colour upgrade	*Iota*	£98
i-Scan 200	*Irlam*	£539
i-Scan 400	*Irlam*	£589
Pineapple Colour Video Digitiser	*Pineapple*	£195
– A3000 boxed	*Pineapple*	£230
Scan-Light A4	*CC*	£277
– with Sheet Feeder	*CC*	£370
Scan-Light Junior	*CC*	£128
– A3000 internal	*CC*	£128
Scan-Light Junior 256	*CC*	£199
– A3000 internal	*CC*	£199
Scan-Light Professional	*CC*	£825
– as above + SCSI interface	*CC*	£910
Spectra	*RISC*	£545
– A3000 Internal	*RISC*	£545
– A3000 External	*RISC*	£565

I²C PRODUCTS

AnDi Oddule	*Baildon*	£49
I²C Adaptor (needed unless you already have an I²C socket)	*Baildon*	£10
I²C SWI (enhanced IIC_Control)	*Baildon*	£15
– bought with Oddule		£5

KEYBOARD COVERS

Seal 'n Type (spill-proof)		
– Archimedes	*Kador*	£14
– A3000	*Kador*	£14

FUNCTION KEY STRIP ORGANISER

Arckey	*ICS*	V0 £3
– pack of 4		V0 £10

Sorry about the small print – we plan to increase the number of pages we use soon

HOW TO ORDER

VAT: UK customers please add 17.5% to the total price, except for the zero-rated items marked V0. Our VAT number is 384 3312 56.

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Overseas carriage: If you are paying by credit card we will add airmail and insurance at cost. Otherwise please add £6 (Europe) or at least £12 (elsewhere) for each software item and send a pounds sterling bank draft payable in England, or Eurocheques for not more than £100 each.

Credit cards are welcome. We do not charge your account until your order has been fulfilled. The name and address for delivery of goods should be as known to the credit card company. If you are leaving an order on our answering machine please include your telephone number, the expiry date of your card, and your calculation of the total payment due.

Official orders are welcome. Payment is due in 14 days. Invoices are subject to carriage and late payment charges.

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NEW LOW PRICES

➤ A3000 INTERNAL 40 MB – ONLY £399 !

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Miniature fan option for fully upgraded A3000s

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E&OE SO39 92JA28 *Please use the following numbers until about 10th February – TEL: 051-632 1234 FAX: 051-632 3434* LICENSED CREDIT BROKER

BEEBUG The Archimedes Specialists

A3000 Hard Drive DTP System

If you have been thinking of getting an A3000 there has never been a better time.

This special offer provides an excellent system ready for immediate use. The hard drive, RAM and Ovation are all installed ready so you can simply turn on and start.

Ovation is the highly acclaimed package combining word processing and DTP. Widely used in education it offers a whole host of features and is powerful and yet simple to use.

Our high speed IDE drive was designed especially for the A3000. It has an access time faster than ST506 or 8 bit SCSI, features auto-parking and sleep mode and is fitted in the internal expansion slot.





- ❑ Acorn A3000 Computer
- ❑ Genuine Acorn Colour Monitor
- ❑ Monitor Plinth
- ❑ 2 Mb RAM
- ❑ 20 Mbyte Internal Hard Drive
- ❑ Ovation DTP

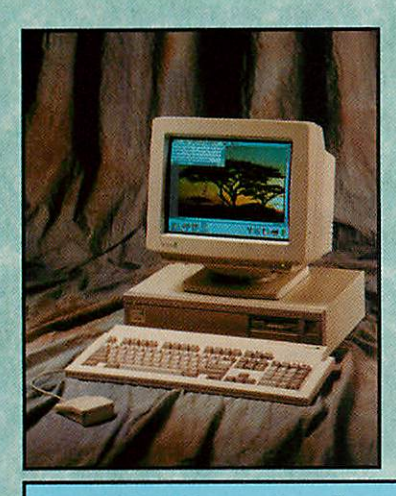
Normal Price £1299 + VAT
Save Over £300

Special Offer £999 + VAT
(£1173.83 INC VAT)

The A3000 Learning Curve is also available if required. This includes Pacmania & Lemmings games, Genesis II Database, 1st Word Plus, Acorn PC Emulator and a 120 min audio training tape. Just add £40 + VAT (£47.00 inc VAT).

Courier Delivery Please add £9.00.

The A5000 Learning Curve



The A5000 is now available from BEEBUG, either from our showroom or mail-order.

BEEBUG are one of Acorns largest dealers and have been supporting the Archimedes range since its launch.

You can have total confidence in BEEBUG. Our technical team are always on-hand to provide any assistance and help that you may need with the A5000.

BEEBUG & RISC Developments also produce the magazine RISC User, dedicated to the Archimedes range.

BEEBUG - The Archimedes Specialists

A5000 Features

- ❑ RISC OS Version 3
- ❑ ARM 3 For Unbelievable Speed
- ❑ 1.6 Mb Format Floppy Drive
- ❑ 40 Mb IDE Hard Drive
- ❑ Acorn Multi-Scan Monitor

The New Learning Curve Pack

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The A5000 Learning Curve Complete With Acorn Multi-scan Monitor Is Now Available For £1799 Inc.
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ACORN DTP PACKAGE TAKES ON THE MAC

ACORN and Computer Concepts have joined forces to launch an Archimedes-based desktop publishing system, targeted at equivalent PC and Apple Mac-based systems.

The DTP system includes Acorn's A540 computer, Computer Concepts' *Impression II* software, a Laser Direct printer and a professional image scanner. At just under £5000, the system offers 'higher performance and twice the print resolution for half the price of an equivalent Mac system,' according to Charles Moir, managing director of Computer Concepts.


DTP SOLUTION – A540, IMPRESSION, PRINTER AND SCANNER

The A540 features the Arm3 Risc processor, 4Mb of Ram, a 120Mb SCSI hard disc and is supplied with a 14in multiscan monitor. *Impression II* – which has sold around 15,000 copies and is used to produce this magazine's editorial pages – has eight Adobe-compatible families of fonts supplied as standard. Also included are: *Equasor*, an equation editing program, and CC's Business Supplement utilities (one group of which allows the importation of files from packages such as *WordPerfect*, *Microsoft Word* and *Wordstar*; mail merging and the production of Postscript files.

The flatbed scanner can scan pages up to 8.5 x 14in at 256 grey levels with a resolution of 300 dots per inch. The Laser Direct printer can produce documents at up to 600dpi.

Acorn's marketing director, Mike O'Riordan, said: 'This system has a significant price performance advantage over any equivalent Mac- or PC-based system. We expect it to attract a great deal of interest, not only from small businesses who may have been put off by the thought of introducing complex DTP systems, but also from printers who regularly carry out DTP work'.

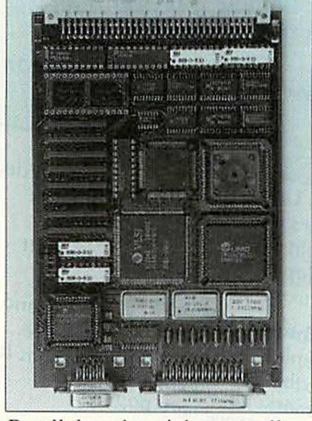
For further information on the new Acorn DTP package, contact Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.

PC ON A CARD FOR THE ARC

ALEPH ONE announced the launch of its PC Expansion Card for the BBC A3000/Archimedes – first revealed in this magazine last October – to educationalists at the recent BETT '92 exhibition.

The device, which is basically a PC on a standard podule expansion card, enables applications that are designed for IBM-compatible PCs to run on Risc OS machines. According to Alex van Someren, Aleph One's technical director, the new card will 'provide significantly greater performance than Acorn's *PC Emulator* software.

'By using a real Intel 80386SX microprocessor and a single-chip PC motherboard, we have ensured complete hardware and software compatibility with IBM and compatible PCs'.



Parallel and serial ports allow peripherals, such as printers and modems, to be connected directly to the card and Aleph One expects the card to appeal to educational users who need to run PC applications.

The two versions of the card include a 1Mb at £595 and a 4Mb at £725. The card works with all Acorn Risc computers, including the BBC A3000 and Archimedes A5000.

● Aleph One has announced a further reduction in the price of its Arm3 upgrade for the Archimedes/A3000 to £199. Contact Aleph One, The Old Courthouse, High Street, Bottisham, Cambridge CB5 9BA. Tel: (0223) 811679.

ARM COMPANY MOVES INTO CONTROL

ADVANCED Risc Machines, (Arm), the Arm chip development company formed between Acorn, Apple and VSLI Technology, has now concluded a licence agreement with GEC Plessey Semiconductors (GPS).

The new agreement enables GPS to manufacture and sell Arm's Risc processors, including the recently-announced Arm6, 60, 61 and 600 and encourage the extension of Arm's Risc technology into embedded control applications. The performance, size and relative low cost and power consumption make the Arm designs ideal for applications including telecom's, network controllers, automotive control and many more applications. For more details contact Arm Ltd, Swaffham Bulbeck, Cambridge CB5 0NA. Tel: (0223) 813000.


ROBIN SAXBY FROM ARM (LEFT) WITH DOUG DUNN OF GPS



FULL MOTION VIDEO SYSTEM FOR THE ARC

A NEW full motion video system, (FMV), combining the processing power of Arm-based Risc machines and the mass storage capabilities of CD-Rom, has been launched by Acorn. Acorn Replay allows an Archimedes computer and a CD-Rom drive to to combined to harness the potential of full motion video as part of a multimedia system.

Simultaneous audio and video is supported, with the system running at up to 25 frames per second. The display can run in the Risc OS desktop, or in a low resolution full screen mode. Full motion video work is restricted in the personal computer market by the storage and performance requirements of video.

For example, one minute of quarter screen 25 frames per second, 256-colour VGA video contains some 115Mb of data which has to be painted on screen at 2Mb/sec. Most PCs have to resort to hardware to assist the process, or accept limited video frame rates or lengths.

Acorn Replay differs from other FMV systems in that it reads highly compressed data from mass storage devices in real time on a standard product with no additional hardware, yet it maintains a constant frame display rate.

The system features a data compression technique which relies on calculating the redundancy between successive video frames, achieving compression factors of between 25 and 40. The software decompression algorithm runs in real time on all Archimedes computers that have at least 2Mb of memory available.

The user can stop the video at any point and 'grab' a frame for pasting into other desktop applications, such as DTP.

Acorn has been working with third party software houses to generate applications incorporating Acorn Replay. Third parties are also being encouraged to produce CDs containing compressed video clips and these could then be used as libraries of clip art for personal applications. The first CD titles should be available from next month.

Acorn's technical director, Malcolm Bird, said: 'Acorn Replay can be used either as a stand-alone system to display film clips, or integrated with a controlling application to provide a video display service to that application, such as a database, an encyclopaedia, or a hyperbook.'

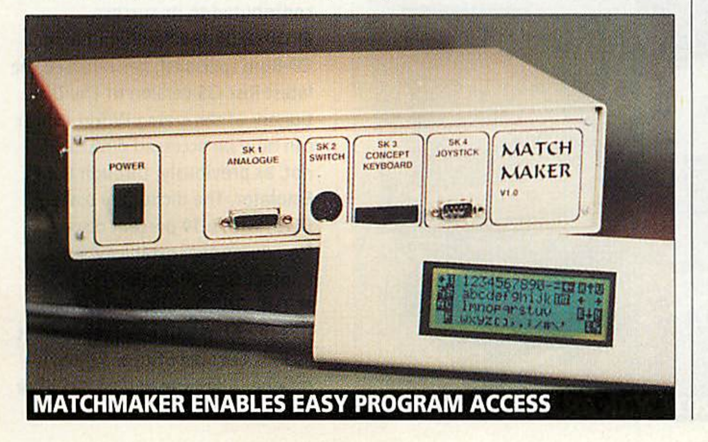
For further information on the full motion video system, contact Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.

MEET YOUR MATCH

SRS SYSTEMS has come up with a new device which enables people with special needs to operate standard software on the Archimedes and the BBC A3000.

The Matchmaker unit allows the connection of virtually any input device (switch, joystick, trackerball, concept keyboard, and so on) to the computer, enabling access to most available 'off-the-shelf' programs.

The speed and sensitivity of the device can be selected easily. The unit also has a keyboard and mouse emulator that are compatible with most available programs. For further information on the Matchmaker unit, contact SRS Systems on 021-643 2877.



MATCHMAKER ENABLES EASY PROGRAM ACCESS

BETTER BETAJET

INTEGREX has launched what it claims is a laser-quality inkjet printer for £199. BetaJet is a high-resolution, A4 monochrome inkjet printer which is said to give 'laser quality output at a 9-pin dot matrix cost'.

The printer emulates the HP Deskjet Plus as standard, with Epson FX 850 and IBM Proprinter emulation available on optional memory cards.

Printing at 160cps draft and 80cps LQ (letter quality), with an 8K buffer, the printer can output pages at the rate of up to two per minute. Resident fonts include Courier, Letter Gothic and Times Nordic, with additional fonts available.

For more details on the Betajet printer contact Integrex Ltd, Church Gresley, Swadlincote, Derby DE11 9PT. Tel: (0283) 551551.

MONO DIGITISER UNDER £50

HCCS has come up with a range of black and white digitiser for the BBC A3000 and Archimedes which start at less than £50.

The new Vision digitisers are designed to take any video signal – from a video cassette recorder, camcorder, laser disc player, and so on – and turn it into a high-quality black and white sprite in a window on the Risc OS desktop.

The image takes approximately 5sec to materialise, but the image capture is in real-time, in other words within one video frame. Image size is 640 pixels x 256 lines, with 128 effective grey scales using ETT (error transfer technique).

The digitiser has been designed to incorporate a fast preview mode for focusing and setting up video sources, which can be processed fully at any time. The software included has additional features such as on-screen contrast and brightness controls, which can be adjusted easily before or after the video frame is captured. This should enable the user to obtain the best results, first time.

The standard sprite file produced can then be saved and edited under *Paint* or other programs, perhaps to become part of a demo sequence, or to add to DTP documents.

Three versions of the digitiser are available: an internal version for the A3000 (£49), an external version for the A3000 (£69) and a half-width podule version for the Archimedes (£49).

A colour upgrade for the digitisers is expected to be launched in June and will cost approximately £30, with a discount to existing users. All prices exclude VAT.

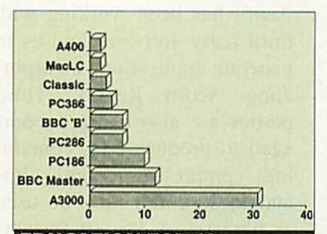
For more information on the range of digitisers, contact HCCS Associates Ltd, 575-583 Durham Road, Gateshead NE9 5JJ. Tel: 091-487 0760.



ACORN KEEPS LEAD IN SCHOOLS MARKET

ACORN has maintained its leading position in the UK schools marketplace, according to a recent survey*, with total penetration of around 64 percent for the period April to September 91.

Acorn's penetration was greatest in the primary sector, where the company picked up 77 percent of purchasers, compared 23 percent for Research Machines (Nimbus). In the secondary sector, they were



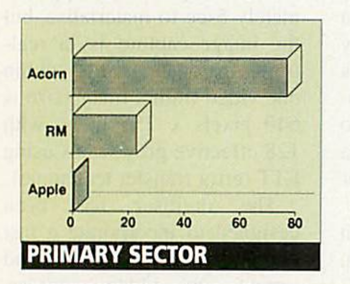
EDUCATION TOP 10

still the biggest sellers, with around half of the purchasers buying Acorn machines. Brand share for Acorn across all schools was 53 percent – 74 percent in primary schools and 42 percent in secondary.

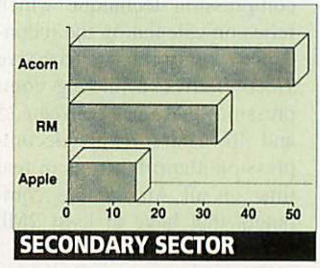
Serious attempts have been made by rival manufacturers, notably RM and Apple, to increase their share of the education cake but, despite this, Acorn's brand share across all schools was practically unchanged compared with a similar survey carried out for the same period in 1990.

The BBC A3000 is still the most popular school computer, (see the adjacent chart) followed by the faithful BBC Master. For further information, contact Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.

**Survey by Research Support and Marketing*



PRIMARY SECTOR



SECONDARY SECTOR

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NEW CUB COLOUR MONITOR

MICROVITEC has added a new high resolution colour monitor to its Cub range. The Auto Scan 2038, seen below linked to an A5000 machine, features a 20in screen and is said to provide high-quality definition and colour.

Intended for high resolution and business graphics applications, the 2038 is compatible with the BBC A3000, and the Archimedes range of computers. The company claims to have sold 330,000 Cubs in the UK alone, and offers an unconditional warranty, lasting three years, on all monitors sold into the education market.

The Auto Scan 2038 costs £1495. Contact Microvitec, Futures Way, Bolling Road, Bradford BD4 7TU. Tel: (0274) 390011.



MICROVITEC'S AUTO SCAN 2038 WITH AN A5000

IN BRIEF

● **COURSES** covering the use and management of Econet networks, originally held only at Acorn's Cambridge headquarters, have been extended to three regional training centres. The courses are now being held at venues in Surrey, Manchester and Durham and are being run by experienced Acorn-contract trainers, although the administration will continue to be handled centrally from Cambridge. For further details on the courses, which will be run from next month, contact Acorn on (0223) 245200.

● **ACE COMPUTING** has produced a printer driver for Hewlett Packard's recently-released 300dpi colour printer. It costs £18.80, including VAT, postage and packing. The company is also working on a driver for Risc OS 3 (the A5000). Contact Ace Computing on (0223) 322559.

● **SPACE** enthusiasts will be interested to hear that data from NASA, the American space agency, is now available on CD-Rom from Spacetech. The Planetary Data System discs contain planetary images and data, organised in directories so that is is easy to work through. For details, contact Spacetech (0305) 822753.

● **EXPLAN** has launched the desktop version of its Arcol colour art program for the Archimedes. The program operates in all full-colour screen modes. It costs £50 (single user), £250 (site licence) and £6.50 to upgrade from previous versions. Contact Explan on (0822) 613868.

● **AROUND 40,000** copies of the hypermedia package, Genesis, are being used in the Acorn marketplace, according to Oak Solutions. The company claims that the success of Acorn's Learning Curve, which includes the package, has contributed to its success.

● **OPTECH**, the Farnham-based CD-Rom specialist, has released the latest Risc OS version of The Dictionary of the Living World, which can now be accessed direct and not, as previously, through the PC Emulator. The dictionary costs £175, with a 10 percent discount for educational establishments. Contact Optech on (0252) 714340.

● **THE THIRD** Acorn Education Directory has just been released. It includes details of over 1700 educational titles and costs £4.95 from Acorn dealers.



GOING FOR GOLD AT BETT

THE SUCCESS of *Desktop Folio* (Archimedes), the 'interactive' writing package from ESM, was affirmed last month when it secured the gold award in the primary category of the Educational Technology Awards. A silver award went to Sherston Software for *Viewpoints*, its mapping and database program for the Archimedes. Two companies were jointly awarded the bronze; Black Cat Software for *Clipboard* (Nimbus), a datahandling package and Broderbund for *Kidpix* (Apple and IBM PC), a painting package.


THE AUTHOR OF DESKTOP FOLIO RECEIVING THE GOLD

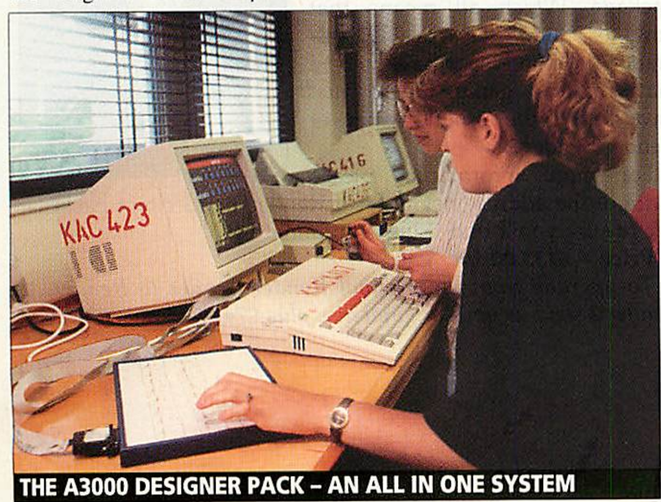
In the secondary category, the gold award was presented to The Times Network Systems for its bundling of the Times CD-Rom disc with the Toshiba CD-Rom drive. Research Machines' Nimbus Notebook NB220 took the silver award. The bronze award went to *World Development Database* (Nimbus and Archimedes) from CWDE Software. It uses *Grass*, a datahandling package, and the judges felt that not only was it useful in itself, but it was to be commended for extending on an already existing product.

This year, special presentations were also awarded to Northwest SEMERC for its contribution to special educational needs, especially for *Phases#2* and *My World*.

Sponsored by *BBC Educational Computing and Technology* magazine, the awards were presented at the opening ceremony of BETT '92 by the minister of state for education, Tim Eggar. In making the presentations, he highlighted the need for support in IT and stressed the growing importance of technologies such as CD-Rom.

A3000 DESIGNER PACK

A CONCEPT Keyboard provides an alternative means of accessing computer software. Now The Concept Keyboard Company has bundled its CK with Longman Logotron's general overlay designer and editor, *Concept Designer*. This includes *TouchData*, similar to the original *Touch Explorer Plus*, and *SoftTouch*, so an overlay can be designed without a CK attached. The A3000 Designer Pack costs £136 (A4), or £152 (A3), from The Concept Keyboard Company on (0962) 843322. A further £50 reduction is available if you trade in an old keyboard (QWERTY or Concept).



THE A3000 DESIGNER PACK – AN ALL IN ONE SYSTEM

CASH BACK

THROUGH an initiative launched at BETT '92, Cumana aims to put £100,000 back into education. Under the Cumana Cashback Club scheme, schools can raise funds, to spend as they like, simply by distributing Cumana catalogues, printed with their own membership number.

Each time a customer places an order quoting that number, the school will collect a cashback value of five percent. To obtain the catalogues, ring the Cashback Club Hotline on (0483) 440603.

If you are considering investing in CD-Rom, you will be glad to hear that Cumana's range of SCSI interfaces for the Arc includes an option called EasyShare, enabling a group of computers to share a single peripheral, such as a CD-Rom drive, without the need for networking. Phone Cumana on (0483) 440603.

Sharon Halpern

NEWS IN BRIEF

● **DESKTOP FOLIO** users will be glad to hear that ESM has added Editor's Pack and Maths Pack, £29.50 each, to its range of support materials for the award-winning program. Also released for the Arc is Bookstore, £39.50, a simple database of book reviews, which pupils can browse through and add their own, and Archimedes World Map Study, £42.50, a map-based database. Contact ESM on (0223) 65445.

● **NOT TO BE** left out, Sherston has adapted two more of its BBC titles to run on the A3000. In Toby at the Seaside, £25, pupils practice science and language skills with the help of Punch and Judy, and in Wizard's Return, £21, they can become a dragon-friend for life, by completing the mathematical adventures. The BBC Emulator needed to run the two programs is included on the discs.

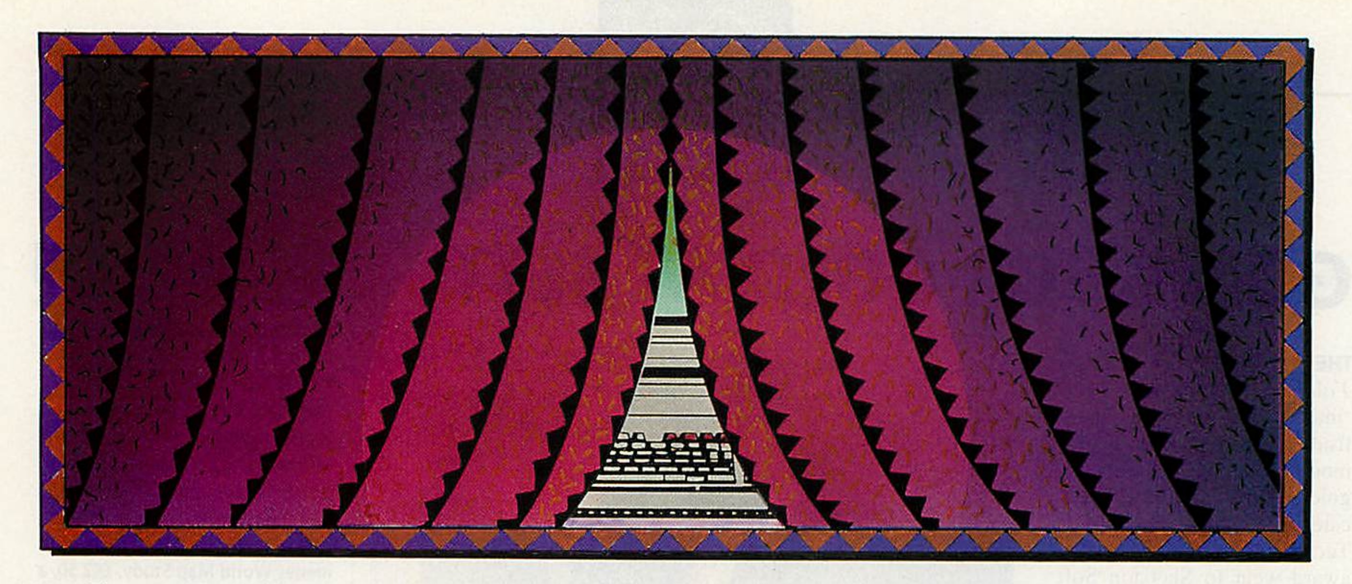
Network versions are now available for some of its BBC programs, along with photocopiable resource packs. For more details contact Sherston on (0666) 840048.

● **PIP INVESTIGATES** Dinosaurs is an adventure and database program, based on the popular character, Pip. Suitable for key stage one, it costs £27.50 and is available from Northern Micromedia on 091-270 0424.

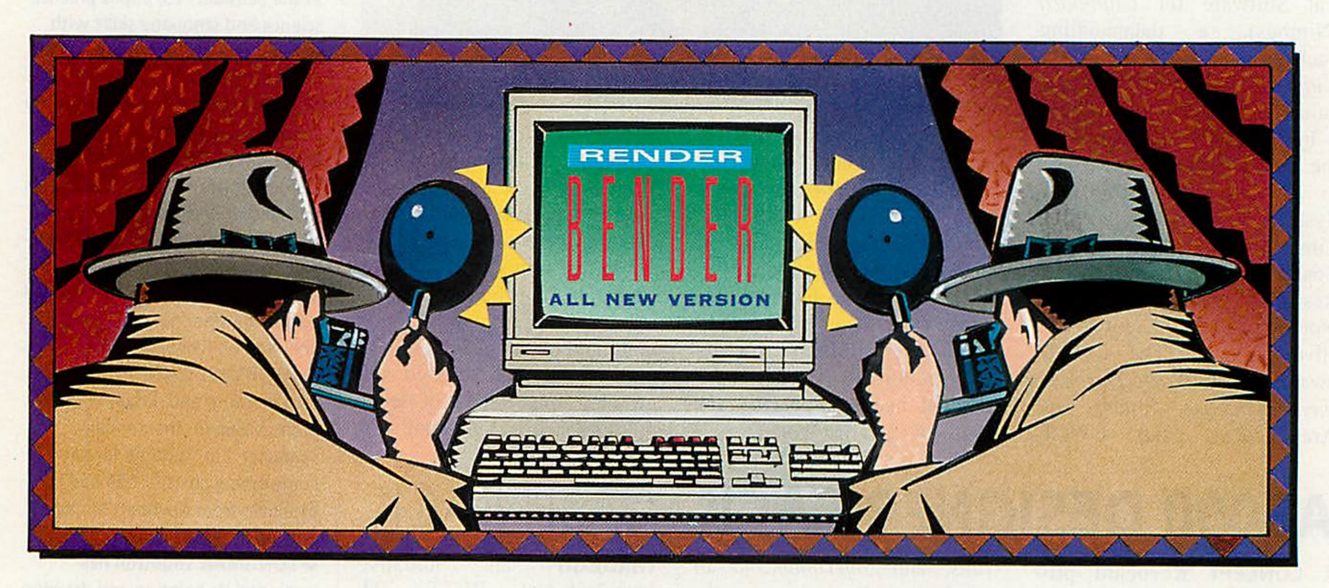
● **LONGMAN** Logotron has upgraded its painting and drawing package, Revelation, to include extended colour mixing, additional image effects and more drawing tools. Revelation 2 comes in both floppy disc and CD-Rom format, costing £119 and £139 respectively.

At £69, Insight is a data logging package for the Archimedes which can be used with most interfaces. It has two programs, and these allow a wide range of experiments to be carried out. Contact Longman Logotron on (0223) 425558.

● **PRIMARY** Archimedes Toolbox Plus was designed by teachers to meet the software needs of primary schools using an Arc. It contains a wide range of applications, including a selection of Printer drivers and fonts, the primary wordprocessor Pendown, and DataSweet2, a datahandling package, plus photocopiable guides to using the computer and software. Prices start at £80. Contact the Hampshire Microtechnology Centre on (0705) 378266.



What does everyone who creates moving pictures want?

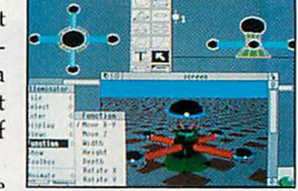


A sneak preview.

Render Bender is the graphics package that allows the user to produce remarkable animated graphic sequences using Ray Tracing.

Ray Tracing isn't nearly as complex as it sounds. Basically, in a ray traced sequence, every pixel on the screen takes all relevant light sources into account. Ensuring that all the reflections and refractions are correctly calculated even if the light is reflected off several surfaces. The image could be no more faithful if you were filming real objects in real light. To produce such a superb animated sequence, however, was quite a difficult task – Until now.

Illuminator has changed all that. It is a fully RISC OS graphical front end to Render Bender. Allowing the user to create a series of frames manually, or to give it a start point and an end point, leaving it to generate the frames in between. What you are getting is the ability to take a sneak preview. You can see what you are going to get, before you get it. After you've created your outline frames in Illuminator, you then transfer the files to Render Bender, the fully RISC OS Ray Tracing part of the package. Which all means that now, to achieve powerful 3D Animation, you no longer have to be a mathematical genius. You just have to be the proud owner of Render Bender 2.



For more information please write to the address below for a Render Bender fact pack. We're sure you'll find it quite illuminating.

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ODE TO A NEW NIGHTINGALE

THIS month's bulletin board is Nightingale BB, based in Bristol and run by Paul James. Paul is a qualified nurse and wanted to start Nightingale to cater for nursing and medical matters because he says, 'all the boards we tried to access, that claimed to be of this nature, did not seem to exist'.

So far Nightingale has been online for a couple of months and is rapidly building up its userbase. Certain areas are restricted to professionals in the medical field only and proof of qualifications and entry requirements are all explained on the board itself.

However, the board does not just cater for medical types but covers all subjects that may appeal to Archimedes and PC users. At the moment there are around 40Mb of PD and shareware programs available to download and this total is growing all the time.

There are also new areas appearing all the time. These include What's on in Bristol, Bath and South Yorkshire and a section called Rainbow, which is run on behalf of people with disabilities. Nightingale has recently joined the extensive Fidonet network, so all the usual conference areas are also included.

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[P]ublic message bases                    [E]chomail message bases
[M]ain menu

[=] Show all filebases                    [$] List my filebases
[+] Join a filebase                       [-] Resign from a filebase
[J] Join all filebases                    [*] Select new conference to access

Filebase [p/j/u/d/s/l/v/c/g/1/2/*/z/=/$/+/-/m/x/?] Show all filebases
 # #Fil Filebase name                      # #Fil Filebase name
30    3 Filelist                          31    2 BBS Lists
39    0 I. B. S. Ltd                      40   13 Arc Comms
41   65 Arc Disc Utilities                42   57 Arc Games
43   12 Arc Databases                     44   21 Arc Interfaces
45    5 Arc Keyboard                      46    5 Arc Maths
47   23 Arc Memory                        48    3 Arc Miscellaneous
49    9 Arc Printer                       50   28 Arc Programming
51   61 Arc Screen                        52   39 Arc Sillys
53   51 Arc Sounds                        54    7 Arc Art
55    9 Arc Fonts                         56    1 Elite Commanders (Archimedes)
60    4 PC Comms                          61    1 PC Utilities
62    3 PC Games                          70    0 Rainbow
90    1 BBC/Electron Comms
                              Press any key
7  Q   Continue   Closed   Nightingale
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NIGHTINGALE BB: JUST WHAT THE DOCTOR ORDERED

Paul runs Nightingale from a 2Mb A3000 computer, armed with an Oak SCSI interface and 49Mb drive and running *ArcBBS* software. He has a Racal-Milgo Maxam IV modem, capable of running at all speeds up to and including V42bis at MNP5. You can log on to Nightingale by setting your comms software to Ansi, 8N1 and dialling (0272) 535962, available 24 hours a day, every day of the year.

Paul Vigay

THE COMMS JARGON-BUSTING GUIDE

COMMS is perhaps the most jargon-littered subject in the world of computers and this amount of shorthand has probably served to shorten online conversations, saving money and time. However this hi-tech language has infiltrated the rest of the computing world and fallen upon the ears of unsuspecting computer users.

It forms a formidable barrier to comms beginners, no matter how computer literate they are. Abbreviations such as ACUG and CRC are commonplace – not to mention CCITT and CEPT. So to help you hack through the jargon jungle each month, I will explain a few such terms.

We begin with ACK – a truncated form of the word acknowledge. An ACK is a non-printing character used in some protocols to indicate that a block of data has been received successfully. On receipt of an ACK, the program which is sending the data knows that it can send more.

An example of the complete redundancy of some comms terms is the following abbreviation: DCE means Data Circuit-terminating Equipment or in other words, a modulator demodulator, modem for short. Likewise, DTE or Data Terminal Equipment is known in ordinary circles as a computer.

The CCITT is the Consultatif International Telephonique et Telegraphique, an organisation which sets international comms standards such as V21, V22m X25 and so on. Another organisation to suffer from this merciless name cropping is CEPT – the European organisation for communications standards.

CEPT define a number of standards that are followed on a European basis, such as the CEPT Videotex standard, which is used to define the differences between the British and French protocols.

Some words in the comms world sound quite harmless. For instance Duplex refers to the transmission of data in two directions simultaneously and EOB is the End Of Block, a non-printing character used in some protocols, usually in association with ACK.

Even you, the user don't escape from the vicious name shortening. An NUA is a Network User Address and is how a computer refers to you or, more accurately, your terminal. The similar sounding NUI, Network User Identity, is used in a PSS (public switched system) for dial-up access by each user, a telephone number in other words.

Well, that's it for this month, watch out for more jargon busting in next months *BBC Acorn User*.

NEWS IN BRIEF

● **EVER** fancied learning more about comms and networks? If so, Learning Tree International run a host of comms courses, ranging from hands-on training days for beginners, to complete expert courses. Prices range from a few hundred pounds upwards, but discounts are available for companies who send more than one applicant. More details from Learning Tree International on freephone (0800) 282353.

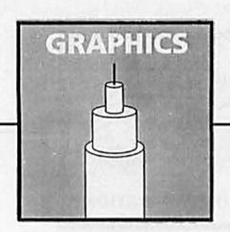
● **COMPUTER CONCEPT'S** long awaited fax podule is now available, priced at £200 plus VAT. More details in later columns, but phone Computer Concepts on (0442) 63933 for more details.

● **IT'S PLUG** time again and news has come to me of the first Archimedes BB to be run using an A5000 computer. Rich in Paradise BB is based in Paignton, Devon and offers support for all aspects of Acorn interest, including message areas and downloadable files. The sysop, Richard Paddle, also hopes to connect up to Fidonet in the very near future, so set your comms software to Ansi, 8N1 and give it a ring on (0803) 666808.

● **HOW** often do you call Directory Enquiries? At a cost of 40p each time, it can work out quite expensive. But if you are a Prestel subscriber, PhoneBase is still available on Prestel. All you need is a viewdata terminal and you can search the telephone directories at your leisure.

Costing between 6p and 13p a minute, it is far cheaper than calling Directory Enquiries –just supply a name and location and the computer will provide a cross-referenced list of matching entries. You can amend your choice or search for another entry. If you are not a Prestel subscriber call free phone (0800) 800878 for details on how to access PhoneBase.

To complement PhoneBase, BT also offer the entire UK Yellow Pages as an online system. Electronic Yellow Pages (EYP) are available 24 hours a day and can be accessed via Prestel or even called direct. There is no charge – all you pay is the local rate. A user guide and more info can be obtained by calling (0734) 506506 during office hours.



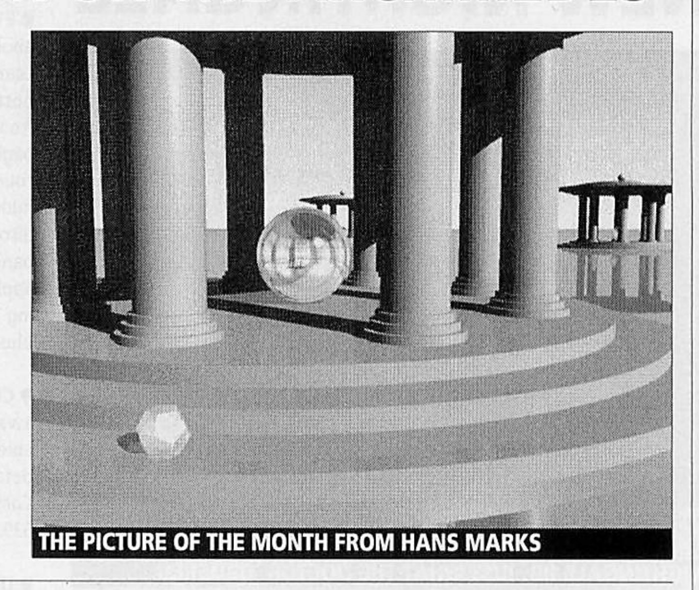
INSPIRATION ON THE ARCHIMEDES

QUITE a few submissions are coming in for our monthly graphics gallery, although at present, there's been nothing from any eight-bit machines. Now we *know* that there are thousands of budding, or budded artists out there with eight-bit machines, so come on you lot – get cracking!

The standard of pictures for the Archimedes is excellent. This month's picture is called Stone and is by Hans Marks of Holland. There is an equally impressive picture from Hans on the subscribers' disc, called Chain. Both were created using his own software.

Rob Miller




THE PICTURE OF THE MONTH FROM HANS MARKS

PLANS TO REVAMP CHAMELEON

4MATION are to upgrade their *Draw* file, colour rendering program *Chameleon*. The authors of *Chameleon* thought that it was a little overshadowed by *smArt*, which was released by 4Mation at the same time, and have now decided to revamp it.

Chameleon 2 will have all the facilities of the original program, with a few extras. Fills will make up a large proportion of *Chameleon*'s tools and will include straight, circular and fountain fills. All will be fully definable by the user, utilising the full 24-bit format that *Draw* files allow.

The software should be ready sometime in the Spring. Although the price has not yet been fixed, it is expected to be slightly higher than that of the original program, to reflect the extra additions. A cheaper upgrade price will of course be available for all registered users of *Chameleon*.

Further details on the upgrade can be obtained by contacting 4Mation, 14 Castle Park Road, Barnstaple, Devon, EX32 8PA. Tel: (0271) 25353.

THE 'POCKET-SIZED' PICTURE

JUST when you thought it was safe to compress all your picture files, along comes another format, promising even greater compression. A new compression standard called JPEG (Joint Photographics Experts Group) standard, is designed for compressing high resolution colour images.

It works by removing 'unwanted' information from a picture. Because of the high resolution of pictures being compressed, it is possible to fool the eye by only retaining information to which the eye is sensitive. Decompressing a picture is quite a complex process and is carried out successively until the user is happy with the result. Due to the nature of the algorithm, decompression can take some time, although there is some dedicated hardware available to speed up the process.

Irlam Instruments Ltd are implementing the JPEG standard into all their software and hope other software/hardware vendors for the Archimedes do likewise. It's no secret that Acorn will eventually support 24-bit colour in hardware and they are also looking at ways of implementing the JPEG standard in relation to 32-bit technology. Contact Irlam Instruments, 133 London Rd, Staines, Middlesex. Tel:(0895) 811401.

SPEEDGRAPH

EVOLUTION Computer Ltd, a company new to the Acorn market, have just announced the SpeedGraph expansion card. It offers two major improvements on the Arc's graphics capabilities.

Firstly, SpeedGraph will increase the possible resolution to 800×600, with 256 colours, and 1024×768, with 16 colours. Unlike the VIDC enhancers currently available, SpeedGraph will have no effect on the speed of the computer when using larger screen sizes: in fact SpeedGraph will have the bonus of speeding the Arc up at normal resolution modes. The new modes also have a high refresh rate, 72 and 60Hz respectively.

Housed in an external box, SpeedGraph requires no podule space. As more and more podules become available from different hardware vendors, this comes as quite a boon. It will work across the full range of Acorn's 32-bit machines from the Archimedes 310 up to the new A5000. SpeedGraph requires a Multisync or VGA monitor to function and costs approx. £280. For further information, contact Evolution Computer Ltd, Portland Buildings, Portland Road, Aldridge, West Midlands, WS9 8PP. Tel: (0922) 55827.

NEWS IN BRIEF

● **AS** a seasoned user of graphics packages, I often have cause to think about what an ideal art package would contain in the way of tools, how it might operate and so on. I'm sure there are plenty of users out there who have a favourite program which would be the best thing since sliced bread, if only it allowed you to ....?

Revelation 2 is getting close to the mark, but it is still lacking in various areas. It has no real grid system for example. My favourite package at the moment is *Arcol*, which is soon to be upgraded. If you have any favourite art packages but know what would make them better, please write in with details and I'll try to put together a list of general likes and dislikes. If there are any companies out there who plan to revamp existing packages or write new ones, perhaps you could take note of what users really want.

● **THE** writers of 4Mation's *Poster*, are hard at work on its successor. There are no in-depth details yet, although the new product will be almost unrecognisable when compared to the original. Everything that is in *Poster* will be in the new program, plus an extensive range of drawing tools. The product is, however, quite a way off, and probably won't make an appearance until the end of the year.

● **CABLENEWS** is a new presentation graphics system for any Archimedes or A3000/A5000 computer. It is designed primarily for situations where you may require a slide show type display, such as point of sale promotions, or exhibitions. Acorn have in fact used it extensively for demonstrating their own products. Lingenuity, the producers of CableNews, can be contacted at: Wood Farm, Linstead Magna, Halesworth, Suffolk. Tel: (0986) 85477

● **ACORN** Replay was launched at the Bett show this year. It is a system that can read highly compressed video and audio data from a mass storage device and display it on the screen as a live video image. This is possible because of the implementation of a technique which removes redundant data between successive frames. Contact Acorn on (0223) 254200

NEXT MONTH

BBC ACORN USER

DECADE OF THE BBC MICRO

It is 10 years since the BBC computer literacy project led to a series of TV programmes which launched the BBC micro, and thus home computing in the UK. We preview a special programme looking back over this exciting decade, and look ahead

ARTWORKS

Computer Concept's new package could be described as the state-of-the-art on the Archimedes. We give you an exclusive preview of its capabilities

A5000 MEMORY BOARDS

No sooner has the new A5000 been launched than a range of memory upgrades come out. We check the boards available

Watch out for the April issue of BAU – available March 12 1992

PLUS

PODULE EXPANSION

We look at the Pres podule expansion, designed to get the most out of your A3000

DIGITISER FOR UNDER £50

A new range of black and white digitisers from HCCS offer a low cost way of importing video images into other applications. We take a look

ARC ASSEMBLER

Dave Lawrence continues his series dedicated to the budding Arm programmer

REGULARS

- All the latest news and views from the world of Acorn
- ★INFO – helpful advice and ideas covering the BBC A3000, Archimedes, BBC B and Master
- Your letters and problems
- Programs galore on the yellow pages and much more

To be sure of your copy, please fill in the coupon below and hand it to your newsagent. Or why not take out a subscription, which includes a free monthly disc? See page 29 for details

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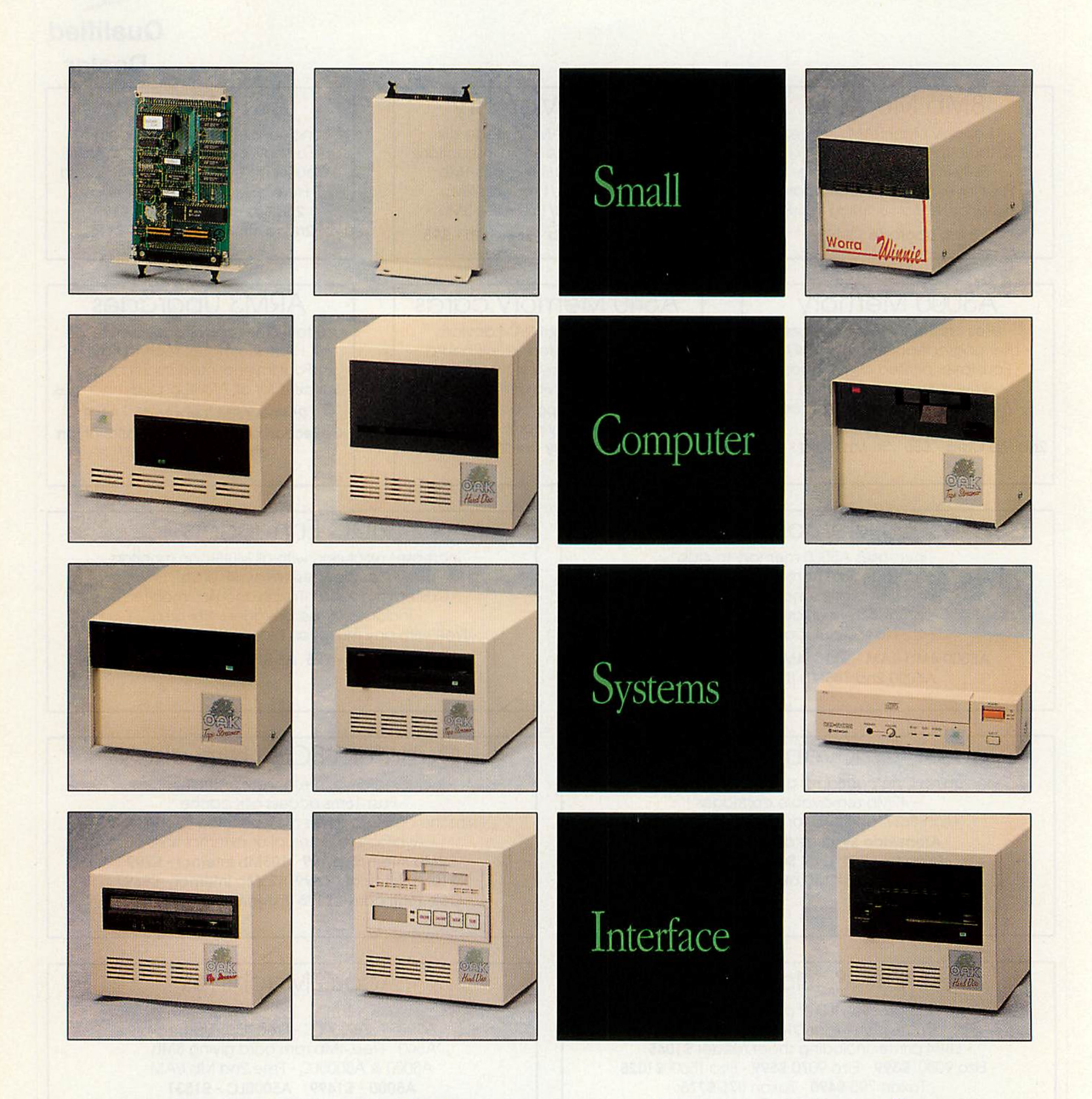
ADDRESS ____________________

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If it's got to work...



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150 Mb	£895.00
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Oak SCSI software is Acorn compatible, and allows hard discs to be partitioned into several logical partitions, which may be write protected if required. This feature can prove invaluable in the classroom situation where applications can be stored on a write protected partition - safe from accidental or malicious tinkering - whilst still allowing a read/write partition for data and scrap files.

Every Oak Solutions hard disc comes complete with over £250 worth of FREE software: the original Genesis hypermedia software, Disc Tree hard disc management software which allows easy backup of your drive to floppy disc, Euclid, the de facto standard for Archimedes 3D software, RISC OS Companion, Remote Logon, and the addictive Worra Battle tank game.

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This advertisement could not hope to mention in detail all the SCSI products we manufacture, so for further details please write or telephone.



COMPATIBILITY PERFORMANCE



STAR LETTER £15

I read with interest the letter in your magazine from a gentleman claiming that an IBM clone may be seen as better value for money than the new A5000. He makes some interesting points, but he also omits a few relevant facts.

I was in a similar situation, contemplating whether to buy a 486SX or the A5000. I eventually chose the Acorn, and can honestly say that I am very pleased. Although I could have bought a 486 for less than an A5000 learning curve package, when I started to price things up on a straight value for money basis, the Acorn package came out on top.

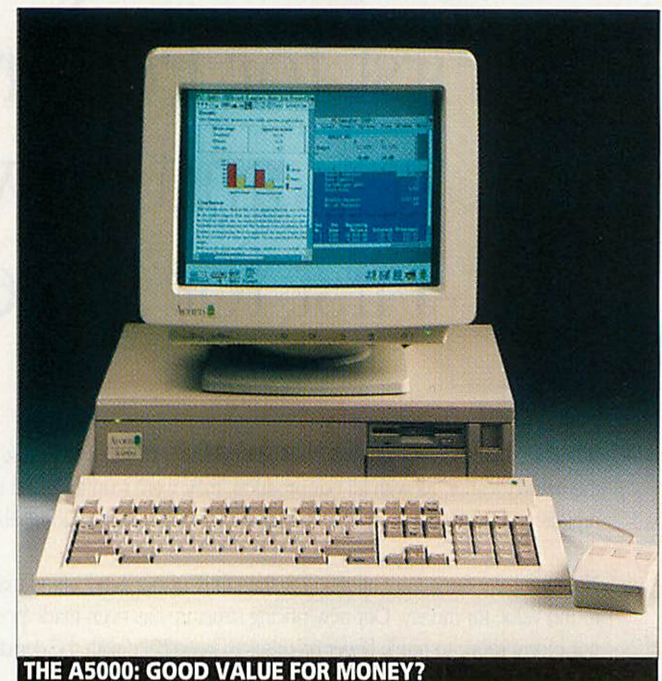
I needed a word processor, a DTP package, a drawing package and a GUI (Graphical User Interface). The *Genesis* and *Paint* applications have all proved useful, as have the extras, such as bundled games, and of course Risc OS 3, which I am delighted with. In addition, I also used Acorn's interest free credit scheme which saved me a further few hundred pounds. And I do not need to pay our for a sound card. All in all I estimated a saving of between six and eight hundred pounds.

The other great inducements to go to Acorn were that one is not overcharged for GUI software. Have you seen the price for windows-compatible packages? For the purpose I bought the machine for – Cad – I now have *WorraCAD* from Oak Solutions and it does all I want it to do for a song. Try buying a GUI PC Cad package for less than £300.

On a different subject, you were looking for comments on applications that run under the PC Emulator? I have just tried *Autoroute* and if you configure the screen correctly, it runs perfectly, even if it does make me glad that I chose Acorn.

A G Weyman
Harrow Weald
Middlesex

This is just one of the responses we received supporting the cost-effectiveness of Acorn machines.



THE A5000: GOOD VALUE FOR MONEY?

QUACK QUACK OOPS!

With reference to John Fairweathers letter in *BBC Acorn User* February 92, about connecting two disc drives to his BBC. I must say that I was very surprised that you didn't suggest the Data Duck which is available from Watford Electronics. I have used a Data Duck for the past three years, and I am pleased to say that it does away with the necessity to mess around with the 'internals' of a drive.

The duck consists of a ribbon cable, with a female connector at one end to the disc drive port and two male connectors the other end, into which you plug into the two disc drive cables. Once connected the disc drive at the end of the duck automatically becomes drive one. Watford also produce a Power Duck which is necessary if one has two separate disc drives without PSU's (Power Supply Units). This device connects to the disc power socket under the left hand side of the BBC and works in the same way as the Data Duck. If one of Mr Fairweather's disc drives has a PSU then there is no need for the Power Duck.

Alan Brown
Workington
Cumbria

NETWORK NICETY

We so often read in your columns of Acorn's efforts that I wanted to publicise the following. Several years ago I purchased a network system for our BBCs from SJ Research of Cambridge. We recently had a problem with part of the system. Instead of taking the 'Oh your equipment is out of date... buy some new stuff' attitude of some firms, SJ worked hard with me to get our old system working.

Through some generosity on their part, I once again have a working system at very little cost to our college. Not all firms exercise their right to apply the 'fair wear and tear' exclusion in their warrantees, or indeed the time limitation. The problem might have been said to be beyond SJ's control, but they had sold the system, and stood behind it.

Tom Boyd
Seaford College
Petworth

COLOUR CONFUSION

Regarding your recent review of colour scanners for the Archimedes, there are a couple of points I wish to make.

Firstly the review incorrectly stated that *ChangeFSI* and *Translator* are bundled with the package. This is not so, although purchasers are encouraged to obtain them from PD libraries or other such sources. Secondly the DT software package will produce sprites files as well as clear files; selecting four, or fewer bits per pixel results in a sprite being produced (and a doubling of scanning speed) as a sprite can provide a reasonable representation of that number of colours or greys.

David Knell
DT Software
Cambridge

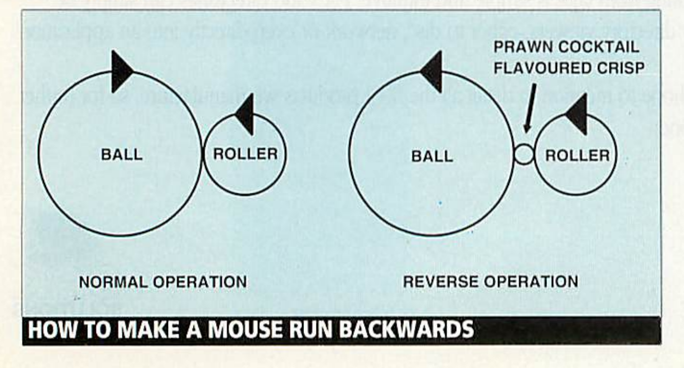
RE: TRACTION

The star letter in *BAU* Jan 92 mentioned a mouse problem. Another one I have found is that the pointer sometimes moves backwards for a short distance. The picture below shows how this can happen.

The piece of dirt acts as an idler between the ball and the roller, reversing the direction of rotation. The worst sort of dirt comes from using an india rubber, it seems to cling to the ball. Taking the ball out and cleaning it is the remedy, but prevention is better.

E W Ayers
Nacton
Ipswich

A good mouse mat is also important if your mouse is to run smoothly. Here in the Acorn User office the general consensus is that foam mats are the best, although there is the other school of thought that considers a good old cutting mat to be superior.



HOW TO MAKE A MOUSE RUN BACKWARDS



QUESTIONS AND ANSWERS

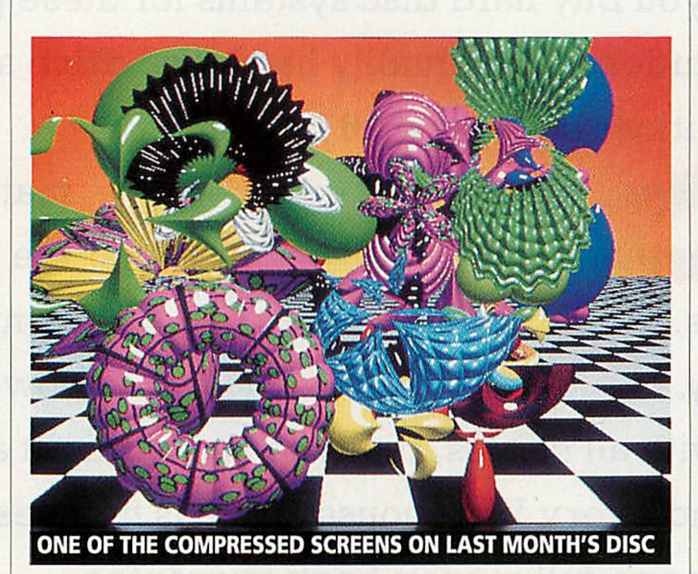
Q Upon receipt of the December monthly disc my son wanted to gain access to the free screens supplied in CFS format. But after loading *CFSReader* and clicking on the CFS drive icon on the icon bar, an error was generated – CFS has no temp directory. After going through the *Readme* file we were still unable to get a display. Please can you help?

R E Mealor
Wirral

A **The reason you are experiencing this problem is that *CFSReader* needs a small workspace on disc where it can decompress files. It is up to you to tell it whereabouts it can carry out this operation.**

This can typically be inside you *System* folder, or in the root directory of the current filing system. The temp directory is set by pressing menu over the CFS icon, and moving over Temp Dir. Then you can simply drag the CFS icon to a directory viewer.

There was a slight problem with one of the screen shots on the disc, in that it was too big to decompress on the current floppy. It is best to move the CFS reader and the CFS files on to a blank floppy before decompressing.


ONE OF THE COMPRESSED SCREENS ON LAST MONTH'S DISC

Q I have an Archimedes with 4Mb of memory and a hard disc. I often use *Pipedream* for my accounts, utilising the Archimedes outline font manager. Although I allocate a large amount of memory (1024K) to fonts, the output using *PrinterDM*, still takes almost 10 minutes per page to print out. Is there any way I can improve this speed?

A.B.E. Ellis
Chelmsford

A **Unfortunately, although increasing the font cache size will dramatically reduce the time it takes for the Archimedes to cache different fonts, the main cause of delay when using *PrinterDM* is the time it takes to send the data to the printer.**

This is restricted by the speed of the hardware in the printer so it can't really be improved upon. However a printer buffer will allow the Archimedes to send more data to the printer at any time, thus freeing the computer quickly so you can get on with other tasks.

You should find that most PD libraries advertised in the pages of *BAU* will be able to supply a printer driver module that you can load in.

Q Please could you tell me if I can connect my Yamaha Portasound-PSS680 to my A3000? If so, will I be able to use it with *Creator*.

Chris Muscat
Swieqi

A **With the addition of a Midi podule you should have no problems. This will allow you to connect any Midi-equipped musical keyboard to your Archimedes. Acorn supplies a combined Midi and User Port expansion card for the A3000, priced at £49 plus VAT. In addition, you will require suitable five pin Din leads to connect your keyboard to the computer. If *Creator* caters for a Midi input then there is no reason why you cannot use your keyboard in conjunction with it. However, *Creator* works mainly with sound samples, rather than music data, so it is worth checking your manual to see which features can be controlled via your Midi keyboard and which require the use of internally created Archimedes sounds.**

Q I have recently bought a second hand BBC Model B, fitted with Rom expansion board and a couple of Roms; *Floppywise* and *Enigma*. As no manuals were provided, could you tell me who produced the two Roms so that I may obtain details.

R. Thomas
Swansea

A **The *Floppywise* Rom was produced by Software Services in Liverpool, but unfortunately they are no longer trading and have no stocks left. *Enigma* was produced by Altra Computers of Leeds, who can still be contacted on (0532) 484961. However, *Enigma* is also no longer available. Your best bet is probably to hunt around local dealers to see if anyone has old stock.**

Sometimes the All Formats Computer Fairs in London, and now around the country, are a good source of discontinued BBC Software. Also it is well worth keeping an eye on our free ads pages.

Q As a Christian minister, it would be of great help to have the Bible on hard disc for the Archimedes. I have seen PC versions around but using them under the PC emulator is slow and it also consumes valuable memory space. Does anyone know if a Risc OS version exists or where the texts can be obtained ?

Philip Foster
Cambridge

A **As you say, there are a number of PC versions available, including the range of Shareware programs. However, one PC Shareware library can supply the entire text of the King James version as plain Ascii files. You can incorporate the text into your own programs. A complete Shareware catalogue can be obtained from: Shareware Marketing, 3a Queen St, Seaton, Devon EX12 2NY**

Q I have written a number of programs to produce animated captions for use on video tape. These often require more than 80K of screen memory. However, when I run programs from the desktop, it always seems to default back to 80K which causes an error to be produced.

Is there any way of changing the screen memory allocation from software rather than fiddling about with the task manager?

Ian Cummins
Paignton

A **Yes, there is a short program, supplied on Applications disc two, which allows you to change various configuration options via simple star commands. It is**

called *MemAlloc* and is located inside the Lander application. To use the program, make a copy of it inside your application and insert the following line into your *!Run* file;

RMEnsure MemAlloc 0 RMLoad <Obey$Dir>.MemAlloc

You can then add the following line: ScreenSize 256k. This extra line will dynamically alter the size of the configured option. Type in *HELP MEMALLOC for details on what commands are supported. The default options will be restored whenever you quit your application and return to the desktop.

Q Please can you give me some advice about the joysticks available for my Archimedes. I read somewhere that I can get one that plugs straight into the serial port, but I don't have this upgrade fitted. Is there any way that I can add a joystick without the expense of these additional interfaces?

Ted Francis
Lancaster

A I haven't seen any joystick interfaces that use the serial port. However, you may have been confused by one advertised by a company called The Serial Port.

They produce a joystick that accepts standard Atari nine pin joysticks and plugs into the printer port. It has a switch so that you can leave your joysticks connected and still use the printer.

This particular model costs £24.95 and is available from The Serial Port, Units 11-14, White Hays North, West Wilts Trading Estate, Westbury, Wiltshire BA13 4JT, tel: (0243) 531194

Q Following the hype about the A5000 I nearly bought one, and some upgrades to graduate from a Turbo Master. But fortunately, I stopped just in time when I found out that there is no hardware option to connect an external 5.25in drive, as on the A3000 and A400 series. I would not have been able to extract data from my existing collection of 5.25in discs, or use the special programs I have written over the years. Nor would I be able to write programs for my son and grandson, who still have eight-bit machines and 5.25in drives.

Of course some clever bod is going to suggest buying a dual 3.5in drive and transferring the data via this, but the drive would be redundant after getting rid of the Master. I bet some schools will have second thoughts when they realise the limitations of the machine.

E A Allchin
Bridgewater

A Actually you can add an external 5.25in drive in exactly the same way as with the A3000, 300/400 series, by adding a disc buffer. A new type of interface is needed but Risc Developments is currently working on one and the company says it should be ready by the mid-February, with an expected price of around £30.

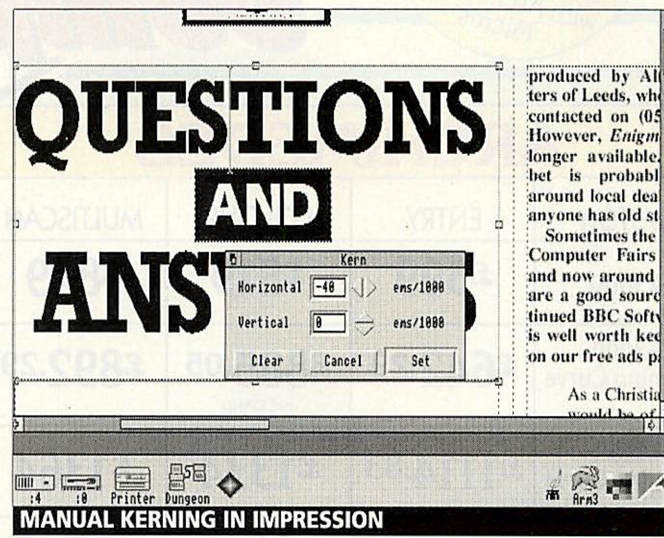
Q I am considering investing in an Acorn A5000 for DTP purposes and wonder if you can help me with a few questions. Firstly, are there any companies who can produce professional bromide PMT's or film from Archimedes format discs?

I also need to know how the Archimedes handles kerning, the distance between characters. For example the distance between AB is usually greater than that of AT – can this be done automatically or do I have to alter it manually? Finally I would like to be able to design fonts: are there any programs available?

Simon Richardson
London

A A number of printing companies are becoming increasingly aware of the Archimedes DTP capability. Try having a word with your local printers to see if they have access to an Archimedes. Alternatively, you can output a postscript file on to an MS-Dos format disc (as described in previous columns) and give them that disc instead.

This file then drives the Linotronic machine to create the bromide or film. To do this effectively you will need to obtain the Impression Business supplement which will include the *Expression* application. This can ensure that all of your font names match correctly, and that the full resolution of the lithographic printer is utilised. Take a look at our Software Showcase for companies that have facilities to output film from PostScript files.



MANUAL KERNING IN IMPRESSION

Most DTP packages, such as Acorn *DTP* and *Impression* by Computer Concepts, will allow you to adjust the kerning manually to suit your own requirements, although at present there are no DTP packages for the Arc with kerning tables, like those in <u>*Quark*</u> on the Mac.

As for your last point, there is a piece of software available, written by Acorn for designing fonts, although it is quite an intricate task. It is called *FontEdit* and your local dealer should be able to obtain a copy for you. Alternatively, you can try contacting the Acorn Customer Services Department on (0223) 245200.

Q I have many fonts, and this causes problems with some applications, particularly *Edit*, which crashes. Is there any way of preventing this?

Polly Gordon
Clapham

A Well, fortunately we have just received the following tip from Mr Haslam in Lancashire which can remove the fonts while *Edit* is run. Remove Run <Edit$Dir>.!RunImage %*0 from the *Edit !Run* file and replace it with the lines;

```
Set Font$Temp <Font$Path>
Unset Font$Path
Desktop<Edit$Dir>.!runimage %*0
Set Font$Path <Font$Temp>
Unset Font$Temp
```

HELP US TO HELP YOU

The Questions and Answers page is your chance to have your problems solved. It can be on any topic – you name it and we'll try to solve it. Please send your questions, whether technical or otherwise, to:

Questions and Answers
BBC Acorn User
20-26 Brunswick Place
London, N1 6DJ.

We are happy to answer your queries on these pages, but regret that we are unable to send personal replies to questions sent in. If you send a disc, please put your name and address on the disc itself. It is also useful if you could include full details of your machine. Please enclose an SAE where necessary and mark on your envelope whether you use a BBC eight-bit micro or 32-bit Acorn A3000/A5000/Archimedes/A5000.



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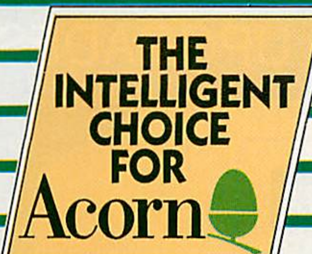
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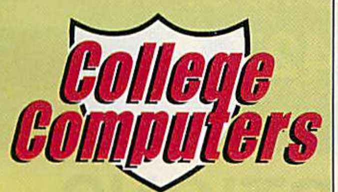
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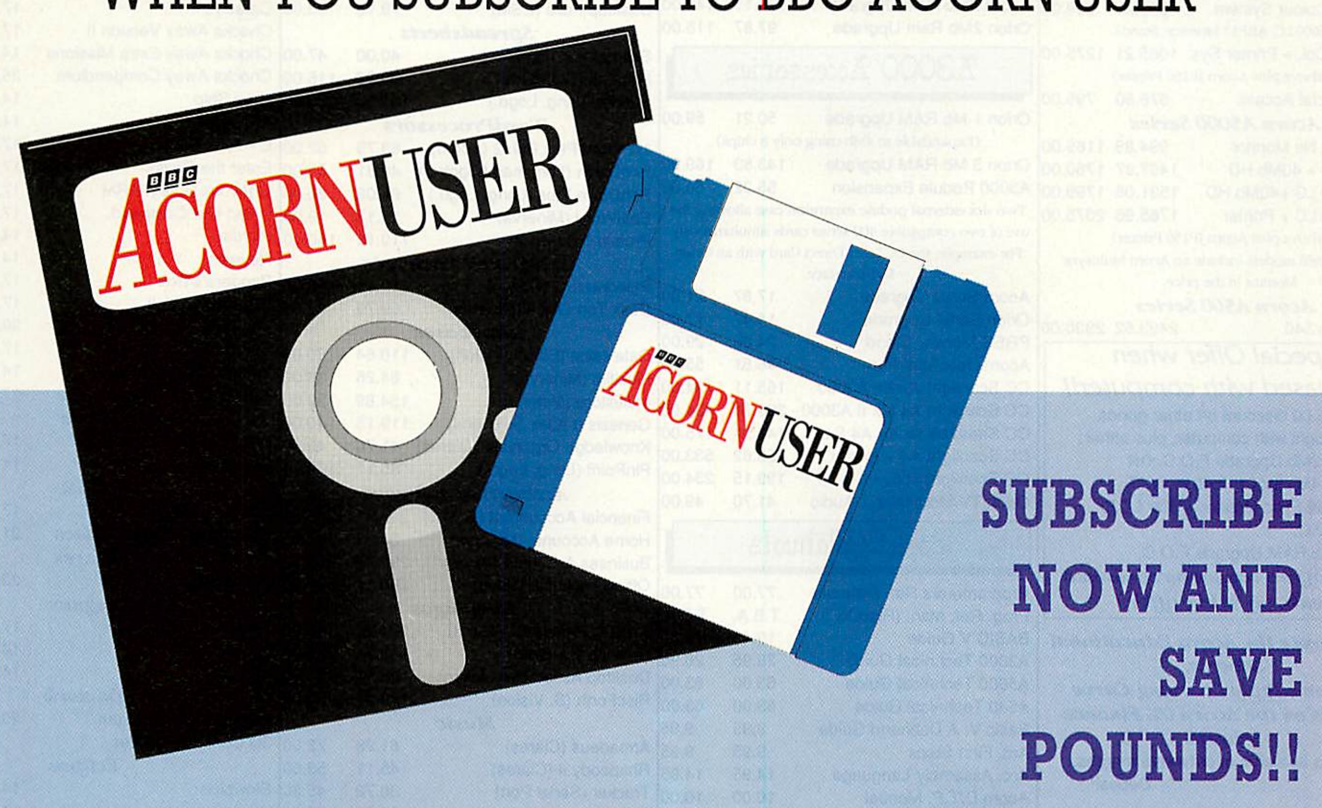
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All A5000 2MB models include an Acorn Multisync Monitor in the price.		
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Archimedes 540	2493.62	2930.00

Special Offer when purchased with computer!!

A3000 - £35.00 discount off other goods bought with computer, plus either: 2Mb Upgrade F.O.C. **OR** 4Mb for £115.00 inc VAT

A540 - Multi-Sync Monitor + Star LC20 F.O.C.

A5000 - 2Mb RAM Upgrade F.O.C.

These offers cannot be combined with any other offer.

We Operate the Acorn Educational Scheme.

We can supply Learning Curve Models on the Acorn 0% Finance Scheme.

Finance available over **twelve** months.

	Monthly	Deposit
A3000 LC Colour System	99.00	75.00
A5000 2Mb LC	179.00	135.00

Finance Prices Shown above **INCLUDE VAT**

Monitors

Acorn Colour (AKF17)	200.00	235.00
Philips CM8833 II Colour	208.51	245.00
Microvitec CUB3000 Colour	200.00	235.00
Taxan MultiVision 775	388.94	457.00
(0.28 Dot Pitch)		
Taxan MultiVision 795A	439.15	516.00
(0.26 Dop Pitch, FST Black Trinitron Anti-Glare Tube)		

Items marked with * will work on A300/A540's

A400/1 Accessories

1Mb RAM Upgrade	38.30	45.00
2Mb RAM Upgrade	74.89	88.00
3Mb RAM Upgrade	104.68	123.00
(Above memory fitted for £10.00 plus courier charge)		
Acorn SCSI Card	238.30*	280.00
Acorn Ethernet II Card	219.57*	258.00
Acorn MIDI Card	64.68*	76.00
Arm 3 Upgrade (Adelph One)	297.87	350.00
4Mb to 8Mb Upgrade	649.36	763.00
C.C. Scan-Light A4	369.36*	434.00
Sheet Feeder for above	148.94*	175.00
C.C. Scan-Light + Feeder	453.62*	533.00
C.C. Scan-Light Junior	165.11*	194.00
C.C. Scan-Light 256	199.15*	234.00
VIDC Enhancer	27.23	32.00
Econet Module	47.66*	56.00
Beebug Disc Buffer	34.04	40.00
Orion TV Modulator + Audio	41.70*	49.00
Replacement Floppy	45.96	54.00

A540 Accessories

4Mb Upgrade (Upto 16Mb)	378.72	445.00
VIDC Enhancer	10.00	11.75

A5000 Accessories

Acorn 2Mb Ram Upgrade	125.11	146.00
Orion 2Mb Ram Upgrade	97.87	115.00

A3000 Accessories

Orion 1 Mb RAM Upgrade	50.21	59.00
(Expandable to 4Mb using only 8 chips)		
Orion 3 Mb RAM Upgrade	143.83	169.00
A3000 Podule Expansion	55.32	65.00
Two slot external podule expansion case allowing the use of two compatible 400 series cards simultaneously. For example, the CC Laser Direct Card with an Orion IDE Interface.		
Acorn Serial Upgrade	17.87	21.00
Orion Serial Upgrade	14.47	17.00
PRES Monitor Stand	24.68	29.00
Acorn User/Midi Port	46.81	55.00
CC Scanlight Junior A3000	165.11	194.00
CC Scanlight A4 Mk II A3000	369.36	434.00
CC Sheetfeeder for A4 Scan.	148.94	175.00
CC Scanlight A4 + feeder	453.62	533.00
CC Scanlight 256	199.15	234.00
Orion TV Modulator + Audio	41.70	49.00

Books/Manuals

Programmers Ref. Manuals	77.00	77.00
Prog. Ref. Man. (RiscOS 3)	T.B.A.	T.B.A.
BASIC V Guide	19.45	19.45
A3000 Technical Guide	28.95	28.95
A5000 Technical Guide	63.00	63.00
A540 Technical Guide	63.00	63.00
Basic V: A Dabhand Guide	9.95	9.95
Arc. First Steps	9.95	9.95
Arc. Assembly Language	14.95	14.95
Acorn D.T.P. Manual	10.00	10.00
1st Word Plus Release 2	10.00	10.00
ANSI C Release 3	20.00	20.00
Acorn Desktop C	25.00	25.00
Acorn Desktop Assembler	25.00	25.00

Printers

PLEASE NOTE

ALL our printers are UK Models and **NOT** grey imports. Please take this into account when deciding where to purchase your printer.

Computer Concepts Laser Direct		
Qume 300dpi 6ppm	859.57	1010.00
600 DPI Laser Direct Card	319.15	375.00
LBP4 Laser 600dpi 4ppm	659.57	775.00
LBP8 Laser 600dpi 8ppm	1319.15	1550.00
Canon		
Bubblejet BJ10e	218.72	257.00
(Please Specify White or Black)		
BJ300	355.74	418.00
BJ330	400.00	480.00
Citizen		
120D+ (Parallel)	114.89	135.00
Swift 9	161.70	190.00
224 (Parallel)	199.15	234.00
Swift 24e	234.89	276.00
Swift 24xe	329.36	387.00
Hewlett Packard		
Deskjet 500	338.72	398.00
Deskjet 500C (Colour)	535.32	629.00
(300dpi Full Colour)		
Star		
LC20	130.21	153.00
LC200 Colour	175.32	206.00
LC24-200 Mono	204.26	240.00
LC24-200 Colour	249.36	293.00

Arc/A3000 Applications

D.T.P.		
Impression II (CC)	127.66	150.00
Impression Junior (CC)	72.34	85.00
Impress. Bus. Supplement (CC)	41.70	49.00
EasiWriter (Icon Technology)	133.62	157.00
Desktop Folio (ESM)	79.15	93.00
Spreadsheets		
Sigmasheet (Minerva)	40.00	47.00
Schema (Clares)	98.72	116.00
Eureka (Long. Logo.)	103.83	120.00
WordProcessors		
1st Word Plus Rel. 2 (Acorn)	69.79	82.00
PenDown (Longman Logotron)	46.81	55.00
PenDown Plus (Long. Logo.)	68.08	80.00
EasiWord (Minerva)	16.17	19.00
Protext 5.0 (Arnor)	119.15	140.00
Integrated Packages		
Pipedream 3 (Colton)	119.15	140.00
Desk Top Office (Minerva)	69.79	82.00
Databases		
Datavision (Silicon Vision)	110.64	130.00
Flexifile (Minerva)	84.26	99.00
Multistore (Minerva)	154.89	182.00
Genesis II (Oak Solutions)	119.15	140.00
Knowledge Organiser (Clares)	41.70	49.00
PinPoint (Long. Logo.)	85.11	100.00
Accounting Software		
Financial Accountant (S. Vis.)	208.51	245.00
Home Accounts (Minerva)	34.89	41.00
Business Accounts (Minerva)	298.72	351.00
Office Tools (S. Vision)	285.11	335.00
Languages		
ANSI C Release 3 (Acorn)	124.26	146.00
Desktop C (Acorn)	188.94	222.00
Desktop Assembler (Acorn)	128.51	151.00
RiscForth (S. Vision)	110.64	130.00
Music		
Armadeus (Clares)	61.28	72.00
Rhapsody II (Clares)	45.11	53.00
Tracker (Serial Port)	38.72	45.50
Notate (Long. Logo.)	51.06	60.00
Utilities		
Arc DFS (Dabs Press)	22.98	27.00
Dot Matrix Colour Driver (Ace)	12.72	14.95
Compression (CC)	41.70	49.00
Education		
Fun Sch. 3 Und. 5's (Database)	17.45	20.50
Fun Sch. 3 5-7 (Database)	17.45	20.50
Fun Sch. 3 Over 7's (Database)	17.45	20.50
Graphics Manipulation		
Poster + Fonts (4Mation)	79.15	93.00
Render Bender II (Clares)	98.72	116.00
Graphbox Professional (Minerva)	104.68	123.00
Graphics - Art		
Pro Artisan (Clares)	79.15	93.00
Revelation (Long. Logo.)	66.38	78.00
Revelation II (Long. Logo.)	102.13	120.00
Atelier (Minerva)	69.79	82.00
Clipart Coll. Vol. 1 (General)	19.95	23.45
Clipart Coll. Vol. 2 (General)	25.49	29.95
Clipart Coll. Vol. 3 (Animals)	25.49	29.95
Clipart Coll. Vol. 4 (Sport)	25.49	29.95
Clipart Coll. Vol. 5 (Characters)	25.49	29.95
Misc		
ARCticulate	17.45	20.50
PC-Emulator V1.7 (Acorn)	93.62	110.00

Cables

Investigator II (Serial Port)	22.98	27.00
Speech (Superior)	14.04	16.50
Arc to Skart + Audio 1.2m	8.72	10.25
Arc to Philips 8833 Mk II 1.2m	8.72	10.25
Arc Keyb'd Extension Cable 2m	7.87	9.25
Arc Mouse Extension Cable 2m	7.87	9.25
Arc Key'd Replacement Cable	7.02	8.25
Arc Mouse Replace. Cable	7.02	8.25
4 way trailing socket	5.11	6.00

Arc/A3000 Games

The Fourth Dimension		
Adventures of Sylvia Lain	17.45	20.50
ARCtist	17.45	20.50
Boogie Buggy	17.45	20.50
Break 147/Superpool	17.45	20.50
Cataclysm	17.45	20.50
Chocks Away Version II	17.45	20.50
Chocks Away Extra Missions	14.04	16.50
Chocks Away Compendium	26.81	31.50
Drop Ship	14.04	16.50
E - Type	14.04	16.50
E - Type Compendium	17.45	20.50
Enter the Realm	17.45	20.50
Grievous Bodily 'ARM	17.45	20.50
Holed Out Compend.	17.45	20.50
Inertia	14.04	16.50
Nevryon	14.04	16.50
Pandora's Box	17.45	20.50
Powerband V. II	17.45	20.50
The Real McCoy 1 or 2	20.85	24.50
Saloon Cars	17.45	20.50
Wimp Game	14.04	16.50
X-Fire	17.45	20.50
Arxe		
Blitz	17.45	20.50
Bambuzle	14.04	16.50
C.I.S.		
Chequered Flag	17.45	20.50
Microdrive 3D World Edition	21.70	25.50
Clares		
Interdicter II	23.83	28.00
Cygnus		
Tower of Babel	17.45	20.50
Twin World	14.04	16.50
Iron Lord	14.04	16.50
Domark		
Mig-29 Super Fulcrum	29.79	35.00
3D Construction Set	P.O.A.	
Eclipse		
Blowpipe	14.04	16.50
WorldScape	14.04	16.50
Eterna		
Ballarena	14.04	16.50
Blaston	14.04	16.50
Bubblefair	14.45	16.50
Cartoon Line	17.45	20.50
Fine Racer	14.04	16.50
Kerbang	11.06	13.00
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Rockfall	14.04	16.50
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Hybrid		
Elite	31.92	37.50
MicroPower		
Chess 3D	14.04	16.50
Zelanites	17.45	20.50
Krisalis		
Chuck Rock	19.57	23.00
James Pond	19.57	23.00
Lemmings	19.57	23.00
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Manchester Utd. Europe	19.57	23.00
World Champ. Boxing Manager	19.57	23.00
World Champ. Squash	19.57	23.00
Simis		
Flight Simulator Toolkit	31.49	37.00
Superior Software		
Air Supremacy	17.45	20.50
Hostages	14.04	16.50
Master Break	14.04	16.50
Virgin		
Magnetic Scrolls Collection	25.11	29.50
Wonderland	24.26	28.50

Please ring for current prices on software **NOT** listed here

PLEASE REMEMBER WHEN COMPARING PRICES - WE DO NOT CHARGE CARRIAGE

on standard delivery within mainland UK unless marked otherwise. Next day courier Service £6.00. Carriage on export orders charged at cost.

Branded Ribbons

Amstrad DMP2000/3160	5.53	6.50
Citizen 120D	3.83	4.50
Citizen Swift 24 Black	4.00	4.70
Citizen Swift 24 Colour	14.98	17.60
Epson LX80/86	4.00	4.70
Epson FX80,MX80,LX800	5.02	5.90
Epson LQ400,550 Fabric	6.00	7.05
Epson MX100,FX1000,FX1050	6.77	7.95
Epson EX800/1000 Black	7.91	9.30
Panasonic KXP145.KXP115	7.91	9.30
Panasonic KXP140	10.00	11.75
Star LC10	4.26	5.00
Star LC10 4 Colour	6.51	7.65
Star LC200 Black	5.96	7.00
Star LC200 Colour	11.91	14.00
Star LC24/10 / LC24 200 Black	8.00	9.40
Star LC24 200 Colour	13.62	16.00

Printer Cartridges

Canon LBP4 Toner Cartridge	55.32	65.00
Canon LBP8 Toner Cartridge	62.13	73.00
Canon BJ130 (BJI481)	10.00	11.75
Canon BJ10e (BC01)	16.17	19.00
Canon BJ300/330 (BJI642)	11.91	14.00
C'jet 132/Canon PJ1080 Black	9.36	11.00
C'jet 132/Canon PJ1080 Colour	14.48	17.25
HP Paintjet Black	20.00	23.50
HP Paintjet Colour	23.40	37.50
HP Deskjet + (Permanent Ink)	12.77	15.00
HP Deskjet 500C Colour	22.98	27.00
Qume Crystal Print Toner Set	66.38	78.00
Qume Crystal Print Drum Set	88.51	104.00

Compatible Ribbons

Amstrad DMP2000	3.40	4.00
Amstrad LQ3500,PCW8256	3.19	3.75
Brother M2024	5.11	6.00
Brother M1009,M1109	4.00	4.70
Brother HR10,15,20,25,35 Fabric	4.30	5.05
Brother HR10,15,20,25,35 MS	4.30	5.05
Canon PW1080A	4.47	5.25
Citizen 120D/Swift 24	3.49	4.10
Epson LX80,86	2.98	3.50
Epson FX80,MX80,LX800,LX850	3.62	4.25
Epson FX1050,LX1000	4.43	5.20
Epson LQ500,LQ800,LQ850	4.17	4.90
Epson LQ1000,LQ1050,FX1000	5.32	6.25
Epson LQ2500,LQ2550	6.55	7.70
Epson EX800	6.55	7.70
Panasonic KXP1081/90,1180/24	4.04	4.75
Seikosha GP100	3.53	4.15
Shanwa CP80 Multistrike	4.98	5.85
Star LC10/LC20	3.40	4.00
Star LC10 4 Colour	5.53	6.50
Star LC24/10,LC24/200	4.68	5.50
Star LC200 Black	3.40	4.00

Discounts available on all ribbons for quantities of 3 or more.

Please call for prices on any ribbons not listed here. We can supply almost any ribbon required and, dependent on quantity, any colour.

Please Note - Quoting the CARMA Group Code speeds up our search for a ribbon compatible with your printer.

I.D.E.

High performance Hard Disc Sub-Systems for Archimedes & A3000 Computers

Fast A.T. Bus Interface
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Fit 2 Drives internally (A3/4/500)
A3000 Compatible
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Interface, Manual, and Cables
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	A3000	A300/400
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210Mb (Cached)	719.00	629.00
425Mb (Cached)	1119.00	1029.00

120Mb Drive for A5000 Only 429.00

All prices INCLUDE VAT @ 17.5%

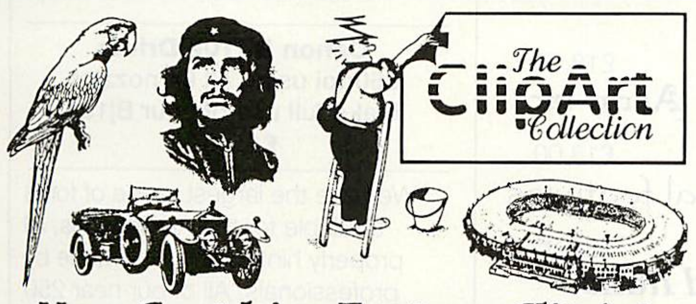
Prices quoted include Card, Cables, Manual and Drive

A3000 Twin Podule Expansion System

Connect two 400 Series cards to your A3000 at the same time. Both podules are available for use with no switching or extra software needed.

Supplied in colour keyed case with full fitting instructions. No soldering required.

£65.00 inc. V.A.T.



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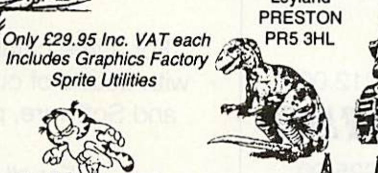
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		Quantity 25	50	100	250	500	1000
5¼	DS/DD 96tpi	N/A	14.00	26.00	60.00	114.89	208.51
		N/A	16.45	30.55	70.50	135.00	245.00
3½	MF/2DD 1Meg	9.74	19.57	34.00	85.11	161.70	297.87
		11.45	23.00	39.95	100.00	190.00	350.00
	Sony Bulk	12.51	25.11	45.11	105.53	200.00	378.72
		14.70	29.50	53.00	124.00	235.00	445.00
	MF/2HD 2Meg	18.72	37.45	68.00	162.55	295.32	530.21
		22.00	44.00	79.90	191.00	347.00	623.00

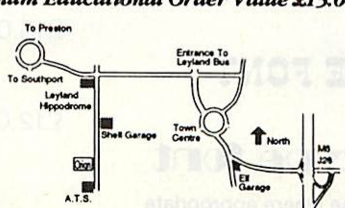
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Minimum Order Value £10.00 Minimum Educational Order Value £15.00. Please note VAT is shown at 17.5%

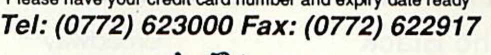
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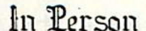
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In Person

Callers most welcome. We are situated 3 miles from M6 J28.
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Computer Holiday for young people !!

Scripture Union runs a computer holiday for 13 to 16 year olds at an attractive school set in the Hertfordshire countryside. The dates? August 3rd to 11th. The price? £101. For details, write to Jim Maddox, S.U. Holidays, 69 Cloverdale Road, London SW2 2DH or phone 081-671-8761.

1

Watford Electronics

(A member of the Jessa group of Companies – Established 1972)



Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 237774 Tlx: 8956095 Fax: (0923) 233642



The sign of Quality

Shop Hours: 9am to 6pm (Mon.-Sat.) Thursday 9am to 8pm. FREE customer car park.
All prices exclusive of VAT; subject to change without notice & available on request.

The choice of Experience

Archimedes micro

System	Basic	Mono	Colour	Multiscan
A410/1	£699	£765	£859	£1024
A540/1	£2495	£2555	£2655	£2815
A3000	£599	£665	£759	£924
A3000L/C	£642	£708	£802	£967
A5000	£999	£1065	£1159	£1324
A5000H/D	–	–	–	£1499
A5000L/C	–	–	–	£1531

Unbeatable Sale Offers on Archimedes Micro

When you purchase an Archimedes Micro from Watford, look what you get FREE with it

Micro	Free Offer
A410/1	ARM 3 Turbo Card
A540/1	Multiscan monitor with VIDC enhancer and LC20 Printer
A3000	2Mb RAM; Monitor plinth and Acorn's A3000 Shoulder Bag (carrying case)

Plus of course our no quibble 12 months FREE On-Site Maintenance on all Archimedes Micros.

Archi Accessories

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• 5.25" 800K external Floppy Drive	£85
• I/O Podule (Analogue/User/1MHz bus)	£79
• I/O Podule (Analogue/User)	£49
• MEMC 1A Upgrade	£42
• MIDI add-on to I/O Podule	£27
• MIDI Expansion Card	£65
• Sound Sampler Mono (Armadillo)	£129
• Sound Sampler Stereo /Midi (Armadillo)	£186
• Chromalock Podule (Wild Vision)	£275
• Econet Network Board	£42
• Archimedes IEEE Interface Adaptor	£269
• Dual RS232 Podule	£195
• 16 bit parallel I/O Card	£195
• Archi replacement mouse – New design	£32
• PC Emulator v1.7	£85
• Software Developers Toolbox	£149
• Floating Point Unit	£455
• SCSI Adaptor Expansion Card	£156
• Keyboard Extension Lead	£6
• 2 Podule Backplane	£25
• 4 Podule Backplane	£38
• Fan for above backplanes	£8
• Risc Os Extras Software Disc	£5
• Ethernet Card	£220
• SCSI Card 8 bit	£129
• A5000 – 2 to 4Mb RAM Upgrade	£122

A3000 Accessories

• 3.5" External Drive £95 • Monitor Stand	£15
• Technical Manual £39 • Serial Upgrade	£17
• A3000 Dust Cover £5	
• A3000 plus Monitor Dust Cover	£9
• A3000 User Port/Midi Upgrade Card	£44
• A3000 User/Analogue/IIC I/O Card	£42
• A3000 External Podule Case	£13



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Coming Soon

Aries 386SX-25MHz PC Card for the Archimedes micro. Watford's R&D team have spent 1000's of man hours to bring you a full specification PC card for the Archimedes. You no longer require Acorn's PC Emulator as all PC software is run locally on the expansion card with custom written software to interface the PC card into the RISC OS environment. Watch this space for further details.

Winter Sale Archimedes A3000 Desk Top Publishing (DTP) Offer

A3000 BBC Archimedes Micro with 3.5" Floppy Disc Drive and a mouse, upgraded to 2Mb RAM, COLOUR Monitor + Lead, 20Mb fast IDE Hard Disc Drive, 'Compression' Utility to increase the Hard Drive capacity to Typically 40Mb, The highly acclaimed Computer Concept's Impression Junior DTP software package.

RRP: £1299

Sale Offer Price: £849

Above Package plus Acorn's Learning Curve **£892**

Special Education discounts available on above package, micros, RAM upgrades, ARM 3 Turbo Card, etc. Please write in or telephone:

(0923) 237774/250335

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

• **R302**-A3000 – to 2MB RAM Upgrade	£39
• **R303**-A3000 – to 2MB RAM Upgrade (expandable to 4MB)	£65
• **R304**-A3000 – to 4MB RAM Upgrade	£139
• **R311**-A305 – to 1MB RAM Upgrade	£30
• **R312**-A305/310 – to 2MB RAM Upgrade	£149
• **R314**-A305/310 – to 4MB RAM Upgrade	£265
• **R412**-A410/1 – to 2MB RAM Upgrade	£35
• **R413**-A420/1 – to 4MB RAM Upgrade	£64
• **R414**-A410/1 – to 4MB RAM Upgrade	£98
• **R810**-A410/1 – to 8MB RAM Upgrade	£599
• **R820**-A420/1 – to 8MB RAM Upgrade	£569
• **R840**-A440/1 – to 8MB RAM Upgrade	£499
• **R814**-R140 – to 8MB RAM Upgrade	£499
• **A5000** – to 2MB additional RAM Upgrade	£123

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UP15	– to 2MB RAM + 40MB Hard Disc	£245
UP20	– to 4MB RAM + 20MB Hard Disc	£225
UP30	– to 4MB RAM + 40MB Hard Disc	£309
UP40	– to 4MB RAM + 53MB Hard Disc	£429

Graphics, Art, Design & Games

GRAPHICS

ARCtist	£19
ARCticulate	£19
Atelier	£65
Artisan II	£45
Artisan Gallery	£16
Autosketch II	£65
Craftshop 1 & 2	£28
Euclid 2	£50
Graph Box	£59
Graphbox Professional	£118
HotLink Presenter	£40
Kermit	£46
Mogul	£17
Poster	£79
Pro Artisan	£70
Prime Art	£69
Render Bender	£58
Snippet	£21
Tween	£21

GAMES

Air Supremacy	£20
Apocalypse	£15
Arcade Soccer	£15
Boogie Buggy	£19
Break 147	£19
Bug Hunter	£14
Caverns	£14
Chess 3D	£14
Chocks Away	£14
Chocks Away Extra	£14
Conqueror	£18
Cops	£14
Corruption	£18
Crisis	£21
Elite	£33
Enter the Realms	£19
Enthar Seven	£21
E-Type	£14
E-Type Designer	£13
Family Favourites	£15
Fireball 2	£19
Holed Out Designer	£13
Holed Out Golf	£13
Hostages	£15
Ibix the Viking	£14
Inter Dictor 2	£26
Iron Lord	£15
Jiglet	£25
Jigsaw	£27
Lemmings	£22
Masterbreak	£16
Magpie	£39
Man at Arms	£16
MahJong Patience	£15
Manchester United Europe	£19
Nevryon	£14
Olympics	£15
Pipe Mania	£17
Pirate	£16
Power Band	£18
Puncman 1 & 2	£16
Puncman 3 & 4	£16
Pysanki	£15
Quazer	£10
Real McCoy	£22
Real McCoy 2	£23
Redshift	£14
Return to Doom	£16
Revelation	£54
Repton 3	£15
Rotor	£19
Saloon Cars	£19
Splice	£25
Sporting Triangles	£24
Star Trader	£14
Superior Golf	£15
Super Pool	£19
Talisman	£12
The Pawn	£19
Thundermonk	£11
Timewatch	£24
Trivial Pursuit	£22
Twin World	£15
U.I.M.	£23
White Magic	£15
White Magic 2	£15
Wimp Game	£13
Worldscape	£16

Miscellaneous

Ancestry	£59
Arccomm 2	£38
Arcterm 7	£64
Armadeus Sound	£60
BBC DFS Reader	£6
Blowpipe	£17
Broadcaster Loader	£65
Compression (CC)	£44
Equasor	£47
FlexiFile	£98
Genesis	£65
Genesis 2	£113
Hearsay Comms Pack	£50
Investigator 2	£22
JX Archi Colour Printer Driver for Citizen & Star Printers	£15
Numerator	£66
Presenter 2	£35
Presenter Story	£145
QEEM 386	£59
Rainforest	£17
Revelation	£58
Rhapsody in Blue 2	£45
Show Page	£127
Speech!	£15
The Victorian	£17
Time Tabler	£549
Toolkit (Clares)	£35
Touchtype	£40
Tracer	£46
Tracker	£39
Vox Box	£47
WorldScape	£17

Archimedes Hard Disc

Watford's ST506 Hard disc drives for A310 & A410 series fit internally into the space provided.
P.S. A310 upgrades require a backplane and a fan.

- **3HDP** – Hard Disc Podule only £135
- **3HD20** – 20Meg H' Disc + Podule for 310 £235
- **3HD40** – 40Meg H' Disc + Podule for 310 £345
- **3HD50** – 53Meg H' Disc + Podule for 310 £474
- **4HD20** – 20Meg Hard Disc for 410 £129
- **4HD40** – 40Meg Hard Disc for 410 £215
- **4HD50** – 53Meg Hard Disc for 410 £335
- A3000 20Meg Hard Disc + Podule £299
- A3000 40Meg Hard Disc + Podule £429

For Archimedes IDE Hard Disc turn to page 14

Desk Top Publisher

Acorn's Archi DTP Package	**£108**
Equasor	**£39**
Impression 2 DTP Pack	**£125**
Impression Junior	**£72**
Expression-PS	**£19**
Tempest DTP Package	**£90**

More Archimedes Products
See Pages 3, 5, 6, 8, 10, 14

Archi Wordprocessors

Pendown Archi	£48	Archie Spell Master	£25
Wordwise + Disc	£24	PD Spellchecker	£40
Image Writer	£25	View	£45
Interword Disc	£24	Graphic Writer	£19
1st Word Plus – 2	£63	EasiWord	£18

Databases

AlphaBase	£36	Magpie	£40
Knowledge Organiser	£42	Multistore v2.01	£185

Spreadsheets

Intersheet Disc	£24	Schema	£89
Viewsheet	£45		

Business Graphics

GammaPlot	£39	Sigmaplot	£39
Interchart Disc	£17		

Integrated Packages

- Logistix £79 • Pipedream 4 £149
- Desktop Office – Database, Graphs & Charts, Wordprocessor Spreadsheet, Communications £98
- Desktop Folio – Wordprocessor, Desktop & Interactive Publishing. Ideal for school environment. £75

A3000 I/O Card (User, Analogue & IIC)

This NEW versatile I/O Card from Watford, fits inside the A3000 and includes an Analog to Digital Converter, a User Port, and an InterIC (IIC) connector.

The card allows many of the peripherals developed for the BBC to be used with the Archimedes A3000. The ADC and User Port have the same pin out and connectors as the BBC computers.

Extensive RISC OS software is supplied to provide BBC OSBYTE calls for support of the ADC and User Ports, including the BASIC keyword ADVAL. The software provides extended RISC OS support for separate interrupts from both the ADC and User Ports, permitting easy interrupt driven operation.

The card is provided with all the software in ROM and is automatically loaded when the machine is turned on.

Peripherals connected to the ports can obtain up to 500mA of power at +5V. A fuse is fitted to the card to protect the A3000 from damage arising from accidental short circuit of the power output.

The card is provided with an extensive manual explaining installation, all software commands, connector pin outs, hardware addresses and example programs.

Features
- An 8 bit User Port with a standard 20 way IDC connector, compatible with the User Port on the BBC computers and the Archimedes I/O Podule.
- A 10 bit Analog to Digital Converter with a standard 15 way D type connector, compatible with the ADC on the BBC range of computers and the Archimedes I/O podule.
- An InterIC (IIC) Port with a 5 pin DIN socket to connect the A3000 to external IIC devices.

£42

Archi Mouse Port Splitter

Our handy little splitter unit eliminates the risk of damaging your micro due to constant plugging and unplugging of the mouse by allowing you to connect both, a joystick and a mouse simultaneously to your Archimedes. £15

Silicon Vision

Gerber Plot	£95	Solids Render	£120
Solid CAD	£120	Solid Tools	£279
Super Plot	£28	Data Vision	£110
Super Dump	£22	Share Holder	£135
Arc PCB Professional			£275
Realtime Solids Modeller			£136

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
- A300/A3000 £21 • A400 £25

Watch this space for our Low Cost – High Performance 4Mb and 8Mb RAM Upgrades for the A5000

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77			£77 each
Assembler; LISP; Prolog X			£149 each
ANSI C Rel. 3	£125	BASIC Compiler	£77
Cambridge Pascal	£60	Logotron Logo	£45
Macro Assembler	£40	Risc Basic	£120
Robo Logo	£69	Risc FORTH	£110



256 Grey-Scale Scanner

Watford proudly introduces its new innovative 256 grey-level hand scanner for the Archimedes range of micros. It offers up to 400 dpi scanning resolution, complete with software.
256 Grey-Scale Scanner is ideal for incorporating pre-drawn logos, artwork, photographs and sketches into desktop publishing documents and other graphics programs. Designed by our own R & D team, it offers the best overall scanning solution for Archimedes micro. Just compare the competition on our price and these outstanding features:
- Full 105mm 400dpi scanning operation in just 3mS per line! (Twice as fast as most scanners.)
- Selectable 256/16/4 grey levels
- Full scan preview, scale to fit windows
- Complete set of image enhancement tools
- Single width podule
- True brightness and contrast control
- Fast RISC OS printing
- Five-function edge detection software, Laplace convolution matrix image enhancement, image smoothing, etc.

Special Launch Price
£185

ULTIMUM – Archimedes A3000 Podule Racking System



THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

Price: £149

Minerva's Archimedes Software

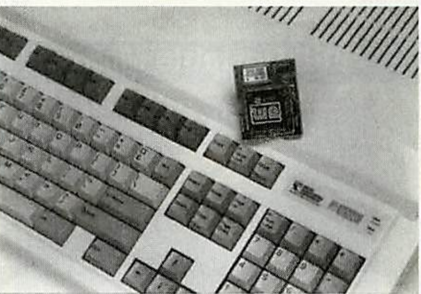
EasyWord	£18	Mailshot*	£27
Home Accounts	£35	Reporter*	£27
Time Tabler	£549	School Admin*	£65
System Delta	£59		

System Delta Program Reference Manual £29
** Requires System Delta to operate*

Stand alone Business Accounts Packages
Sales; Purchase; Order Processing and Invoicing; Nominal; Stock management
£79 per module
or Complete Business Package **£325**

ARM 3 Turbo Card

Simply The Best



Here it is at last – the all new Mark 2 version of Watford's highly acclaimed ARM 3 processor board for the Archimedes and now also the A3000 series computers. Using the latest surface mount technology on a high quality four layer circuit board we have reduced the overall size to a mere 53mm x 45mm, and the cost to only £199. Mk II upgrade will increase the speed of your micro by a factor of 3 to 6.
Any competent A300 or A400/1 series micro owner can fit the upgrade himself, as we provide full fitting instructions and a special ARM chip extraction tool. However for A3000 micros and those not wishing to perform the upgrade themselves, we will collect, upgrade and return your micro by courier service, at an additional cost of £18.
(A300 and old A440 series owners please note – you will need to upgrade to MEMC1A for ARM3 to work.)
In response to many of our customers requests, we have extended the Offer Price to 28/2/1992.

RRP £249

Offer Price £185

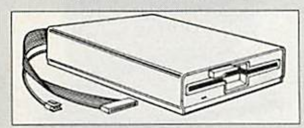
Acorn have satisfactorily evaluated Watford's ARM 3 upgrade and the A3000 upgrades are fitted by Acorn approved surface mount technology centre, therefore its fitment will not invalidate Acorn's warranty on the micro.

Continued→ → → → → → → → → →

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399**

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during February

Add-Ons & Accessories

Econet Module for the Master	£45
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Ecolink	£270

Z88 Portable Micro



£179

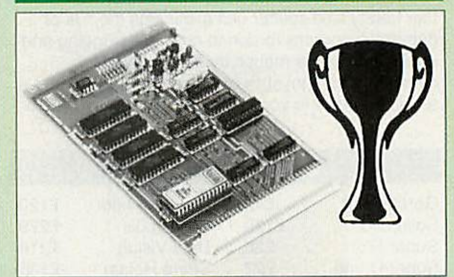
FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack	£16
• 128K RAM Pack or 128K EPROM Pack	£32
• 512K RAM Pack	£86
• Z88 Eprom Eraser Unit	£38
• Z88 Spellmaster for Pipedream	£40
• Z88 Carrying Case	£8
• Z88 Computing Book	£9.95
• AA Nicad Rechargeable Battery	£1.50
• Battery Charger Compact & Fast	£6
• Z88 Serial Printer Cable	£8
• Z88 Parallel Printer Cable	£18
• Z88 to Archi Link	£15
• Z88 to BBC Link £8 • Z BASE	£56
• Z88 to PC Link II £27 • Z TAPE	£42
• Z88 to Macintosh £32 • Z TERM	£42
• Z88 Mains Adaptor £9 • Z88 Modem	£114

Archi Real-Time Digitiser



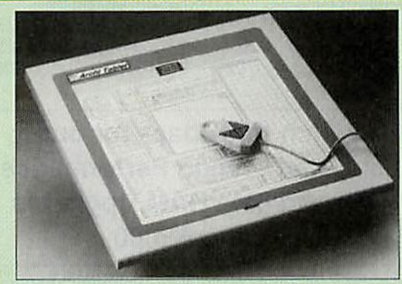
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £139

A Set of Colour Filters for colour image grabbing using a video camera **£16**

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).

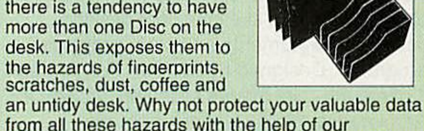
(FREE this month, PC Mouse Drivers & Art package)

Special Price £175

(Price includes Tablet, Leads, Software & Puck) Stylus Optional Extra **£15**

Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus **£110**

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	**£16.00**
• Watford DFS Kit complete	**£69.00**
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	**£12.00**
• DFS Manual (comprehensive)	**£6.95**
• Acorn DNFS ROM	**£17.00**
• Acorn ADFS ROM only	**£25.00**
• Acorn 1772 DFS ROM Kit	**£49.00**

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the *disk – Ours* allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

• SPECIAL PRICE	**£44.00**
• DDFS Manual	(No VAT) **£6.95**
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.



3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	***£5***
• *10 x 5.25" D/S D/D 40T (745)*	***£5***
• *10 x 5.25" S/S D/D 80 Track (746)*	***£7***
• *10 x 5.25" D/S D/D 80 Track (747)*	***£7***
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	***£9***
• *10 x 3.5" S/S D/D 40/80 Track*	***£7***
• *10 x 3.5" D/S D/D 40/80 Track*	***£7***
• *10 x 3.5" Double Sided High Density*	***£13***



Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

• *10 x **M3** 3.5" D/S D/D 80 Track*	*£7*
• *10 x **M9** 3.5" D/S High Density*	*£12*
• *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
• *10 x **M5** 5.25" D/S D/D 40 Track*	*£5*
• *10 x **M7** 5.25" D/S D/D 80 Track*	*£7*
• *10 x **M8** 5.25" D/S H/D Hi-Density*	*£9*
• ***M2** 3" Double Sided*	*£2.50 each*



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and Double Density and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Various UK "manufacturers" of disc drives for the BBC Micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

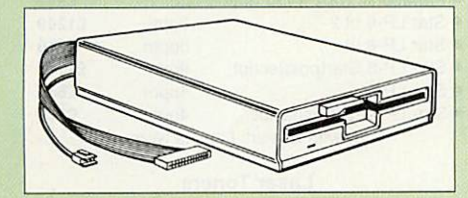
If you look around the popular BBC Micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

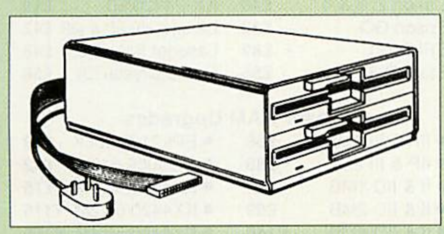
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space. Your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double Plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"



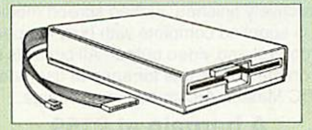


Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• **CLS400S:**	Single, 40/80 track 400K Double sided Drive	**£70**
• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£138**
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	**£80**
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£153**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Disc Drive/DDFS Offer



- The popular CLS400S 40/80 track switchable disc drive.
- Watford's popular Mk II DDFS Interface (allows up to 720K storage). Will run both in single & double density modes.
- A comprehensive DFS Operating manual

Bargain at Only **£116** (Offer valid until stocks last)

3.5" DISC DRIVE

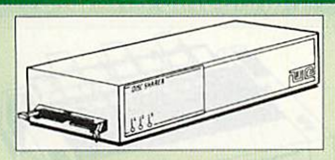


These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	**£62**
• **CLD400S:**	Twin Disc Drives, 800K	**£109**
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	**£83**
• **CD35:**	Twin Disc Drives, 800K	**£126**

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drive Sharer



(Ideal for educational establishments)

A low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC Micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables **£55**

Disc Drives in Monitor Stand



• **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use. **£165**

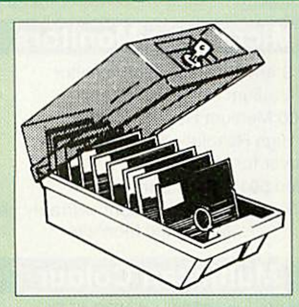
• **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5". **£154**

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of Cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

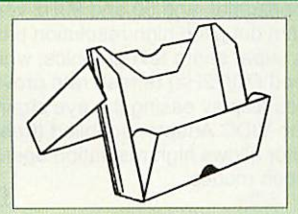


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs.	**£1.50**
Holds up to 10 x 5.25" Discs.	**£2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	**£3.20**
Single CS (with PSU)	**£3.25**
Twin CLD (without PSU)	**£3.85**
Twin CD (with PSU)	**£3.90**

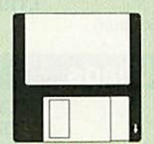
Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

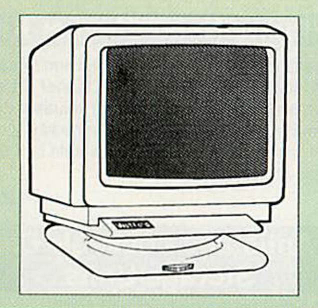




BULK PACK DISCS in lots of 100

Type	S/S 40T	D/S 40T	D/S 80T
• Without Sleeves 5.25"	**£30**	**£35**	**£40**
• With Sleeves 5.25"	**£33**	**£38**	**£43**
• 3.5" D/S D/D	**£27 for 50**		**£49 for 100**

Continued→ → → → → → → → → →



Microvitec Monitors

- **1431** – Standard Resolution Monitor £169
- **1451** – Medium Resolution Monitor £209
- **Cub3000** Medium Res for A3000 £189
- **1441** – High Resolution Monitor £359
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

Now 3 years Parts & Labour warranty on all Microvitec Monitors

Multiscan Colour

Eizo 9060S	£389	NEC 6FG	£1525
Eizo 9070S	£579	Taxan 770LR	£362
NEC 3FG	£370	Taxan 775	£362
NEC 4FG	£465	Taxan 795	£402
NEC 5FG	£850	Taxan 875	£685

- VIDC Enhancer Board £25

(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

Aries AlphaScan Monitor

Pound for Pound, the AlphaScan VGA Multiscan monitor provides the maximum performance and greatest flexlbility of any 14" colour monitor for the Archimedes micro.

Its multiscan circuitry provides automatic adjustment for frequencies between 30 and 60KHz horizontal, and 50 and 90Hz vertical. Its 0.28mm dot pitch high resolution tube provides super sharp text graphics, while a high speed (70/72Hz) refresh rate provides a flicker-free display easing the eye strain. The Multivideo VIDC Adaptor supplied (free) with the monitor allows high resolution operation in all screen modes.

£325

Philips Monitors

- **BM7502** 12" Hi-res Green Monitor £67
- **BM7522** 12" Hi-res Amber Monitor £67
- **CM8833** 14" Med. Res Colour Monitor £165
- Dust Cover for Philips Monitors £6

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £164

Refurbished Monitors

Philips 14" Refurbished Colour Monitors, same specification as the 'Star Buy' Monitors above £119

(Offer valid while stocks last)

Spare Monitor Leads

- **BNC Lead for Zenith or Philips** £3
- Skart Monitor Lead £5
- RGB lead for TAXAN Monitors £3
- Archimedes Colour Monitor Lead £7.50

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

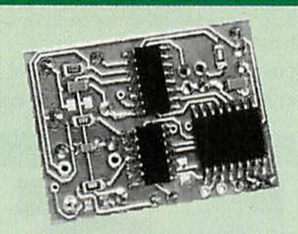
£12

Aries 2000 Colour Monitor

This attractively finished, etched screen medium res monitor is supplied complete with built-in speaker, volume control and video output. All controls are located on the front panel for ease of use. Ideal for BBC, BBC Master, Archimedes and Amiga.

A bargain at £159

Watford VIDC Enhancer



This unique VIDC add-on board for the Archimedes, caters for all types of Multiscan and VGA monitor and mode requirements. There are 2 versions to suit all requirements. The multimode software supplied, provides all the new modes for the selected monitor type, including the now standard Computer Concepts modes. With VGA monitor, you are no longer restricted to a few modes. A WIMP application supplied on disc, allows new modes to be designed and existing modes to be modified for particular monitors.

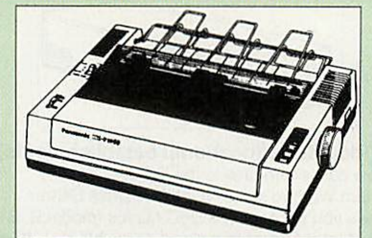
Super VGA VIDC Card: This provides support for both VGA and Multisync monitors. A unique electronic design allows the horizontal and vertical sync to be buffered and have the polarity changed under software control

£45

MultiVideo VIDC Card: As above but for MultiScan monitors only.

£25

Panasonic Printers



KX-P1123	£129	KX-P1654	*£335
KX-P1124i	£173	KX-P1695	£272
KX-P1170	£100	KX-P2624	*£295
KX-P1624	£272		

*** Price includes 12 months On-site warranty**

Cut Sheet Feeders

P36 – 1124/24i £79 **P37** – 1123/70/80 £69
P38 – P1624/95; P2624 £129

Buffers

P12 4K Buffer Board for KX-P1081 £55
P14 32K Buffer P1123/24/70/80 P1540/92/95; P1624/54/95 £16

Serial Interfaces

P19 for P1123/24/24i/70/80/1624/54/95/2624 £49

Citizen Printers

120D Plus	£100	Swift 9	£129
124D	£145	Swift 24E#	£249
224	£185	Swift 24X	£299
PN-48	£209	PN48 Ribbon	£4

FREE Colour Option with Swift 24E

- Swift 24 Colour Option £29
- Swift 24 Ribbons Black £4 Colour £13
- Citizen/Archimedes Colour Printer Driver £15

Integrex Colour Jet

- Colour Jet 132 Printer £449
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £21
- Black Cartridge £12.40
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Star Printers

LC15	£173	SJ48 Inkjet	£174
LC20	£100	XB24-200 Colour	£295
LC24-10	£133	XB24-250 Colour	£355
LC24-15	£240	XB24 Colour kit	£29
LC24-200	£164	ZA200 Colour	£234
LC24-200 Colour	£203	ZA250	£297
LC200 Colour	£143		

- Star/Archimedes Colour Printer Driver £15

Star Accessories

Cut Sheet Feeder

LC10/200/24-10 £65 LC15/LC24-15 £125
XB24-10 £80 XB24-15 £139

Serial Interfaces

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £55

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC/XB24-10; 15; LC200 £55

Ribbons

LC10; LC10-II; LC15	Black £4;	Colour £6
LC-200; LC24-200	Black £5;	Colour £12
XB24-10; XB24-15	Black £5;	Colour £12

Laser Printers

All Laser Printers include 12 months On-site maintenance

Canon LBP-4+	4ppm	£575
Canon LBP-8 III	8ppm	£970
Canon LBP-8 IIIR	8ppm	£1440
Canon LBP-8 IIIT	8ppm	£1340
Epson EPL4100	6ppm	£620
Epson EPL7500	6ppm	£1159
HP Laserjet IIP+		£625
HP Laserjet III	8ppm	£1015
HP Laserjet IIID	8ppm	£1720
HP Laserjet IIIP	4ppm	£695
HP Laserjet IIIsi	16ppm	£2695
Panasonic KX-P4420	8ppm*	£620
Panasonic KX-P4450i*	11ppm*	£925
Panasonic KX-4455 Postscript	11ppm*	£1450
Panasonic KX-P4430 Satin Print		£999
Star LP-8 III 2	8ppm	£1249
Star LP-8 III	8ppm	£910
Star LP-8 Star(post)script	8ppm	£1140
Star LP-4	4ppm	£565
Star LP-4PS Postscript	4ppm	£779

* Now with 2 years On-site warranty

Laser Toners

Canon 2, 3 & 4	£46	KX-P4420/50	£19
Epson GQ	£13	Laserjet HP IIP & IIIP	£42
EPL7100	£82	Laserjet II/D, III/D	£48
Star LP-8	£56	Qume Crystal (3)	£58

Laser RAM Upgrades

IIP & III 1MB	£56	EPL7100 256K	£39
IIP & III 2MB	£88	GQ5000 512K	£42
II & IID 1MB	£64	KX4420/50 1M	£75
II & IID 2MB	£99	KX4420/50 2M	£115
II & IID 4MB	£146	KX4420/50 4M	£195
Canon LBP4 1M	£105	Star LP8 1M	£139
Canon LBP8 2M	£125	Star LP8 2M	£275

Laser Drum & Developer

Epson Drum GQ5000	£93	EPL7100	£129
Panasonic 4420 Drum	£60	Developer	£59
Panasonic 4450 Drum	£93	Developer	£80
Qume Drum	£76	Developer	£56

Jetpage Postscript Cartridge

- HP IIP/III £229 IID & IIID £235

Various Add-Ons

- Laserjet Appletalk Interface £135
- HP Adobe Postscript £399
- Pacific Page Postscript £259
- HP Premier Font Collection £28
- Jetfont Superset for II & IID £127
- Laserjet various Font cartridges from £45

Hewlett-Packard Printers

- # Desk Jet 500 £275 • Paintjet XL £1045
- Desk Jet 500 Col. £475 • Quiet Jet Plus £384
- Desk Jet Cartridge £14 • HP Think Jet £265
- Paint Jet Colour £430

Now 3 years extended Parts & Labour warranty

- Paintjet Cartridges Black £19; Colour £25
- Desk Jet 500 256K RAM cartridge £129
- HP Epson FX Emulation Cartridge for Desk Jet £59
- Desk Jet Unlimited (Book No VAT) £19.75

Canon Bubblejet Printers

	Printer	CSF	D'ble Bin	Ink Cart
BJ10EX	£185	£43		£16
BJ300	£337	£88	£65	£12
BJ330	£380	£110	£79	£12
BJC800C	£1549			

- Spare Battery pack for BJ10E £33

NEC Pinwriter Printers

- P20 £180 • P70 £419
- P30 £240 • P90 £635
- P60 £335
- P60/70 Colour Option Kit £59
- Ribbons Black for P20/30 £6 for P60/70/90 £7
- Ribbons for P60/70/90 Black £9 Colour £13.50

Cut Sheet Feeders

P20 £59; P30 £85; P60 £89; P70/90 £80

Epson Printers

DFX5000	£1079	LQ1060 Colour	£595
DFX8000	£1979	LQ1070	£315
FX850	£264	LQ1170	£437
FX1050	£336	LQ2550+	£675
LQ200	£162	LX400	£101
LQ450	£165	LX850+	£140
LQ570	£205	LX1050	£206
LQ860 Colour	£440	SQ850	£432
LQ870	£368	SQ2550	£625

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550 £69
EX800/FX800/850/LQ800/850 £130
FX/LQ 1000/1050/SQ850 £159
LQ 2550 £390 SQ2550 £390

Tractor Feed for

LQ800 £44; LQ850/FX850 £69; LQ1050/FX1050 £85; LQ2500 £90; LQ2550 £90.

Accessories

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65
- Multifont Card for LQ550/850/1050 £95

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232 £28 RS232 + 2K Buffer £52

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£4
IBM/Archimedes Parallel Lead 5 metres	£10
IBM/Archimedes Parallel Lead 10 metres	£15
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

Plotters

- HP7440A £415 • HP7475A £592

Roland Plotters

- DXY1100 £495 • DXY1200 £625
- DXY1300 £825 • DXY2500 £2345
- DXY3500 £2955 • Sketchmate £310
- Roland plotter Pens, Fibre tip £7.50

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £21
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 2,000 Sheets 15" x 11" Fanfold Paper £16
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £21
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Laser Printer Labels on A4 Sheets

3750 70 x 29mm (3 Rows)	£13.50
3000 70 x 37mm (3 Rows)	£13.25
2625 70 x 42mm (3 Rows)	£13.00

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
DMP4000	£3.75	£4.85
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.00	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£6	

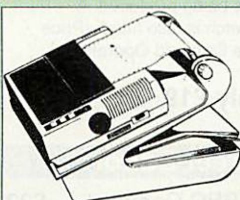
Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595 £6
P115 for KX-P1180 £7 **P145** for KX-P1124 £7
P140 for KX-P1540 £8 **P155** for KX-P1624 £8

Colour Ribbons for KX-P1081, 1592 & 1595
Brown, Blue or Red £9 each

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergonomic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Type

Connects	Serial	Parallel
• 2 to 1	£10	£11
• 3 to 1	£13	£14
• 4 to 1	£16	£17

Professional Type

Connects	Serial	Parallel
• 2 to 1	£17	£18
• 3 to 1	£22	£25
• 5 to 1	£34	£38

Cables extra at £6 each

2 Way Compact Printer Switch

A handy 2 way printer switch can be attached to the micro or monitor for ease of use.

• Centronics **£18**; • Serial **£17**

(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Parallel
2 to 1	£40	£45
4 to 1	£62	£49
8 to 1	–	£89

256k Multi Spooler

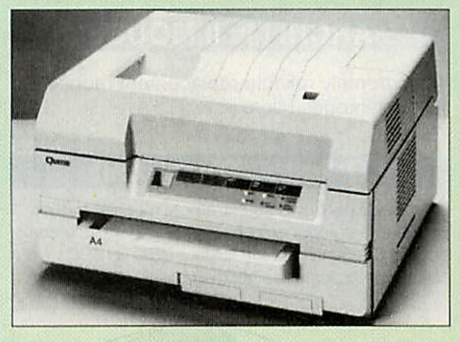
These Auto Parallel Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out £135 • 4 In/2 out £169
- 8 In/1 out £199

Compact Converter Units

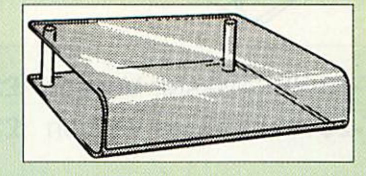
Serial to Parallel £36 Parallel to Serial £37

Laser Direct



- Laser Direct Qume 6ppm complete £769
- Special High Res Card 600 DPI for Canon LPB 4 & LPB 8 Laser Printers £325
- LPB 4 Printer plus High Res Card £899
- LPB 8III Printer plus High Res Card £1299

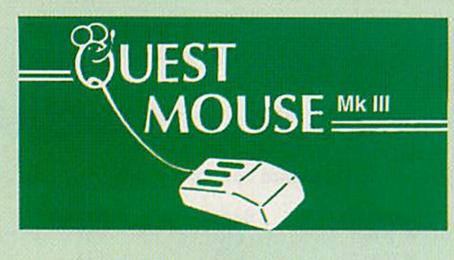
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version **£16** (carr £3)
136 Column version **£20** (carr £4)

Continued→ → → → → → → → → →



- Quest Mouse III & Quest Paint £59
- Quest Mouse III, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse III only £30
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software



Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

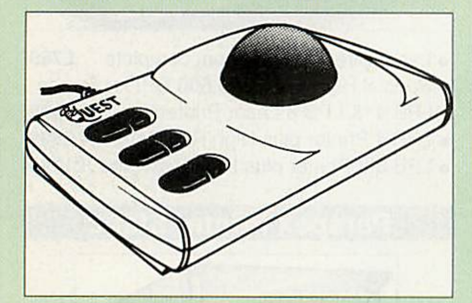
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

Quest – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version **£25**
QT-20 Archimedes Version **£26**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£36
RB2 including Quest Paint	£69
RB2-A for Archimedes	£37

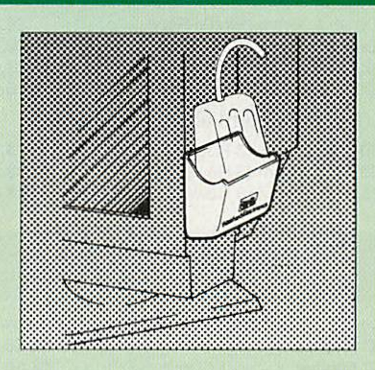
THE NEW Mk III AMX MOUSE

- **AMX Mouse plus Super Art £54**

(Please specify for BBC, Master or Compact)

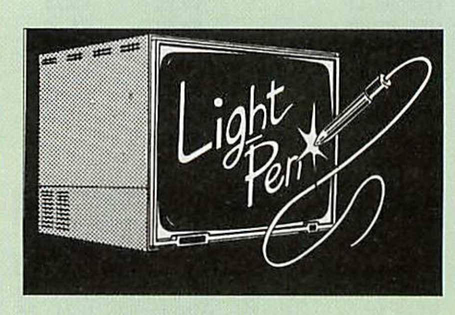
- AMX MOUSE ONLY £29
- AMX SUPERART Package £29
- AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse £25
- PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker £13
- AMX DESIGN (ROM) £34
- AMX XAM Educational £15
- AMX EXTRA EXTRA £16
- AMX MAX A gem of desktop (ROM) £20
- MOUSE MAT £3

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. At £4 it does not cost a rodent's ransom.

Price £3



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £19

Fleet Street Editor

Software pack for BBC Compact	£22
Fonts N Graphics Disc Utility	£13
XTRA Admin	£12
Walt Disney	£12

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

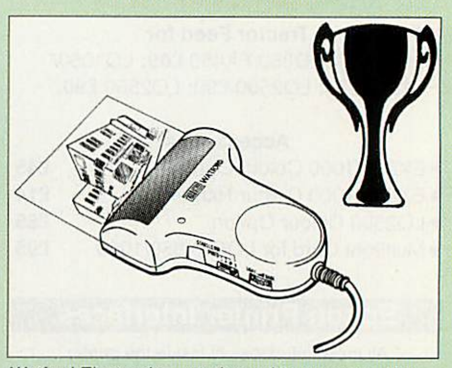
£99

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

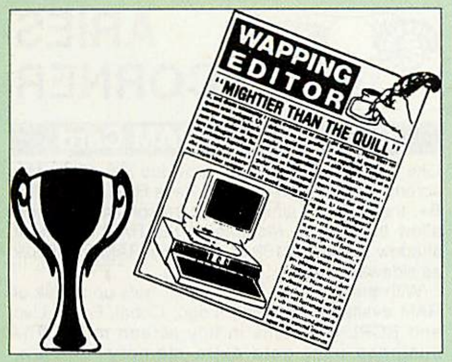
Beeb Hand Scanner

Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.
The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.
All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£125**



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack	**£59**
Wapping Editor plus Mouse	**£79**

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Archi A4 Scanner



This most advanced Archi A4 image scanner is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.
All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

New Low Prices:

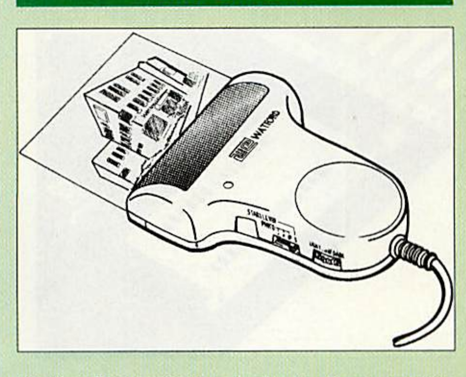
Archi A4 Scanner	£349
Sheet Feeder for above	£95
Scanner + Sheet Feeder	£419

(Dealers Inquiry welcome)

Computer Concept Scanlight

• Scan-Light A4	£375
• Scan-Light A4 + Sheet Feeder	£475
• Scan-Light Junior mono	£178
• Scan-Light Junior 256	£215

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

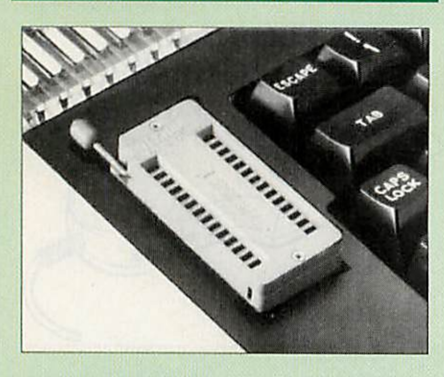
Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

AHS-4 Archi 300/400 Version	**£149**
AHS-3 Archi A3000 Version	**£169**

Continued→ → → → → → → → →

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18**

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

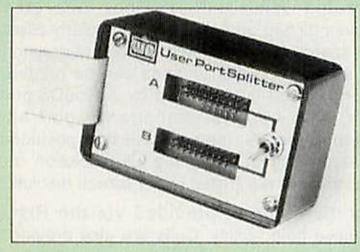
- Complete System **£11**
- Spare Cartridges **£2.75**
- Spare Rack **£1.65**

ROM Cartridges for the BBC Master

Will also accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£8**; Quad **£13**

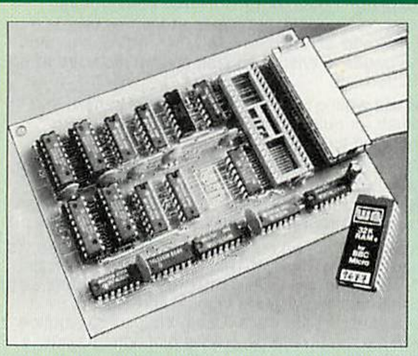
User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22**

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Simply plug the ribbon cable plug into the 6502 socket and gain a massive 32K of extra RAM.

- While word processing, you don't wait for a slow printer, type in text while printing and save on expensive printer buffers.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28K bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the full 32k or the bottom 12K of the expansion RAM as a printer Buffer. (P.S. Only 12K printer buffer can be used with Wordwise & WW+, due to the way they are written).
- Unique facility to turn ROMs off and on again.

Only £54

(Price includes a comprehensive manual and the ROM)



Commander Joystick

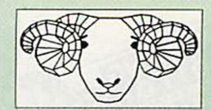


Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:

- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Price: £15



ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£59**

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:		
	Aries B-12	**£36**
	Aries B-12C	**£5**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238

Voltmace Joysticks

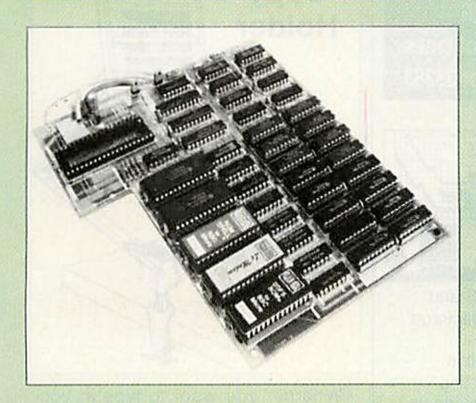
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 9 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, Watford's ROM/RAM card.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- ROM/RAM card with 32k DRAM **£45**
- ROM/RAM card with 64k DRAM **£59**
- ROM/RAM card with a massive 128k DRAM **£99**

OPTIONAL EXTRAS:

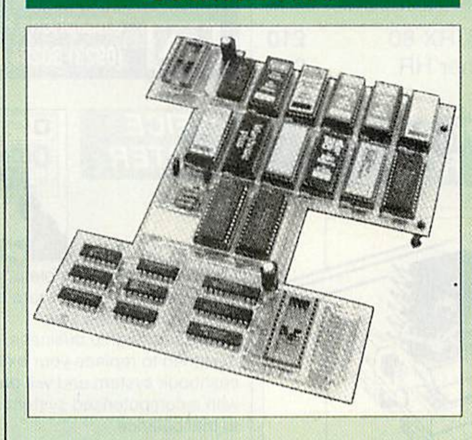
- 16k plug-in Static RAM kit £8
- 16k DRAM for Upgrade £13
- Battery backup £3
- Read and Write protect switches £2 each

Complete ROM-RAM card with all options fitted £109



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Solderless Sideways ROM Socket Board



The key features of this no fuss, easy to install card are:

- Increases your BBC Micro's ROM capacity from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8**

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer. **Only: £8**

BBC Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £20.00
- Maths with a Story 2 (Disc). 4 further maths programs. £20.00
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. £17.00
- ECOLOGY O-Level program. £20.00
- POLYMERS O-Level program. £20.00
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20.00
- ADVANCED TELETEXT SYSTEM £8.65
- PERIOD TABLE SOFTWARE £20.00
- Computers at Work – Primary £17.35
- Electric Fields 6-14 years £11.25
- Espana Viva – 3 Discs £19.95
- WHITE KNIGHT Chess game £16.00
- A Vous La France £29.00
- **FUN SCHOOL 2 – Red:** Under 6 yrs £12.00
- **FUN SCHOOL 2 – Green:** 6-8 yrs £12.25
- **FUN SCHOOL 2 – Blue:** 8 yrs+ . £12.50
- **FUN SCHOOL 3 – Red** £18.50
- **FUN SCHOOL 3 – Green** £18.50
- **FUN SCHOOL 3 – Blue** £18.50
- Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+ £26
- More French Games – Another 6 games 12 years+ £26
- Au Restaurant and Accident de Route 12 years+ £26
- Boulogne and Oh-Les – 2 programs for beginners £26
- Letters to French Penpals – 11 years+ £26
- French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16 £22
- Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+ £22
- More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+ £22
- The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages £26
- An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years £26
- Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years £26
- The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years £22
- PUNCMAN Learning punctuation
  - Puncman 1 & 2 for 7 – 13 years £15
  - Puncman 3 & 4 for 8 – 14 years £15
  - Puncman 5 & 6 for 8 – 15 years £15
- Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+ £18
- Letters & Pictures – Introduces phonic skills to Infants 6-8 years £15
- Numbers & Pictures – Early number learning is a great fun (4-6 years) £15
- Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults) £15
- Maps & landscapes No. 1 (9-14 years) £18
- Help Your Child learn Basic Map work No. 2 (9-14 years) £18
- Pirate – Educational Adventure (8-14 years) £15
- Spelling Week by Week (6-14 years) £18

Archimedes Software

- Animated Alphabet (3-6 yrs) £21
- Arcventure (8-12 yrs) £29
- Bookbinder £43
- Bumper Disc £14
- Bumper Disc 2 £14
- Craftshop 1 £26
- Craftshop 2 £26
- Christmas Allsorts – Clip Art (6-16 yrs) £16
- Converta-Key £16
- Data Word £16
- Desktop Stories £35
- DigiSim £35
- Dream Time (5-7 yrs) £23
- Droom £19
- Farm (5-7 yrs) £19
- Fleet Street Phantom (9-13 yrs) £25
- Fun School 2A Red (up to 6 years) £12
- Fun School 2A Green (6-8 years) £14
- Fun School 2A Blue (8 years +) £14
- Gate Array Teaching System £68
- Glimpse Clip Art Utility (7-16 yrs) £8
- Highlighter (6-16 yrs) £42
- Jiglet £27
- Jigsaw £28
- Mapventure (9-13 yrs) £24
- Microbugs £24
- Money Matters £16
- Nature Park Adventure (7-9 yrs) £27
- Numerator £60
- Picture Book £16
- Recall (6-13 yrs) £39
- Sellardore Tales £24
- Snippet £26
- Space Mission Mada (9-13 yrs) –
- Sting of the Dump (9-13 yrs) £22
- Target Maths £16
- Viewpoints (9-12 yrs) £33
- Wizard's Revenge (7-10 yrs) £17
- Worst Witch (7-10 yrs) £25

Continued→ → → → → → → → → →

Computer Concept's ROMS

Communicator	£49
Disc Doctor	£18
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42
Wordwise	£24

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell with 80 track disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
Overview packs 1 & 2	£65
Hi-View	£38

MINI OFFICE II

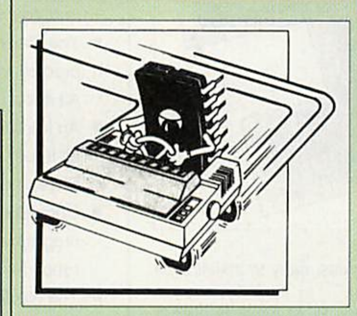
DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

(When ordering please specify for which Micro & 40 or 80 track Disc)

View Printer Driver Discs

Epson FX & RX 80	£10
Juki & Brother HR	£10

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £29



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

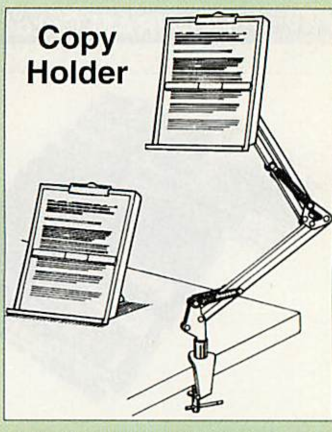
BEEBPLOT – Provides visual representation from Spreadsheet data.

Only £10 (Disc)

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £14

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£8** (carr. £3)
Angle poise **£12** (carr. £3)

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

ALL PRICES EXCLUDE VAT

BOOKS
(No VAT on Books)

15 Hr Wordprocessing BBC/View	£6.95
15 Hr Wordprocessing BBC/WW & WW+	£6.95
30 Hour BASIC (BBC Micro)	£12.95
1st Word Plus Rel. 2 Manual	£10.00
A3000 Technical Reference Manual	£29.00
Acorn DTP A Guide to	£17.00
Advanced User Guide for BBC	**£10.95**
Archimedes 1st Step – Beginners Guide	£9.95
Archimedes Assembly Language	£14.95
Archimedes BBC Basic Guide	£20
Archimedes DTP Manual	£10.00
Archimedes Operating System	£14.95
Archimedes Risc-Os Programmers Reference Manual	£79.00
Assembly Language Quick Ref.	£21.95
BASIC 2 – User Guide	£2
Basic V – A Dabhand Guide	£9.95
BBC Basic Guide (Archimedes)	£19.95
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Z88 Computing	£9.95
Z88 Magic	£14.95

BOOKS for IBM PC & Compatibles

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1-2-3 Using – Rel. 3	£25.95
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Corel Draw Quick Ref Thro V1.2	£7.95
Corel Draw made easy	£24.95
Corel Draw v2 Quick Ref	£8.45
dBase 3/4 Complete Ref	£27.45
dBase III Plus – Complete Reference	£19.95
dBase III Plus Handbook 2nd Edition	£22.95
dBase Instant Reference (III & III+)	£10.95
dBase IV – Handbook	£21.95
Desk Jet Unlimited	£19.95
DOS & BIOS Function – Quick Ref Guide	£7.95
DOS Instant Ref.	£9.75
DOS Instant Reference (up to 3.3)	£6.95
DOS Power Tools	£46.45
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Excel for Windows – Quick Ref.	£8.95
Fax – Management with	£7.95
FAX – Managing with	£12.95
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Novell Network – The ABC of	£21.95
Novell Network – Using	£27.45
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Pagemaker – Using	£22.95
PCs & Compatible Computers for Beginners	£14.95
PC Crash Course 2.0 2nd Edition	£19.95
PC Tools – Quick Ref	£8.45
Programming Guide to EGA & VGA Cards	£25.95
Quattro – Mastering Pro 3	£21.95
Quattro Pro III – Using	£25.95
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Smartware II – Mastering	£22.95
Smartware II – Using	£27.45
Smart, tips, tricks and traps (QUE)	£22.95
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Wordperfect 5.1 – 1st Book of	£15.50
Wordperfect 5.1 – Mastering	£24.95
Wordperfect 5.1 Quick Start	£18.45
Wordperfect 5.1 – Using Special Ed	£25.95
Wordperfect for Beginners	£17.45
Wordstar & CPM Made Easy	£15.75
Wordstar Using 5.5 & 6 3rd Ed	£25.95
Wordstar 6.0 Made Easy	£15.95

Carriage on Books vary between £2 to £4.00, depending on their weight

New Release

ACORN TO PC

Stop the Confusion!

Do you have to use both Acorn computers and PC's? Would you like to use your Archimedes or A3000 in PC-emulation mode but are unsure of the new commands?

Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

'ACORN TO PC' also acts as a handy reference guide to all Acorn star commands and their MS-DOS equivalents. It also has an extensive and readable explanation of the directory tree and hierarchical filing systems in general. Both DFS and ADFS Acorn systems are covered.

'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £12.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.

Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.

A book you will enjoy to use as a reference, or read from cover to cover, over and over.

Only: **£14.95** (No VAT)

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed.

Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

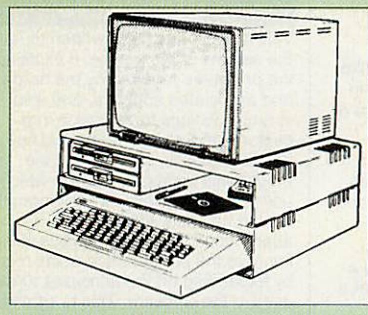
Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives & read only ADFS and Watford DDFS – not DFS).

Price: £39

(Please write in for technical literature)

Continued→ → → → → →

Plinths for the BBC B & Master 128K Micros

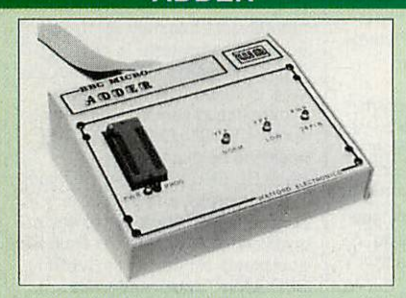


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationery. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

ADDER



The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£55 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast.

- **ERASER EB** – Standard version erases up to 16 chips. **£34**
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£36**
- Spare UV tubes. **£12**

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 250234 or 233383

Servisol Foam Cleaner

This king size multipurpose foam cleaner spray is ideal for cleaning Keyboard, Monitor, Disc Drive & Computer furniture surfaces.

£2.50

Antistatic Aerosol Spray

Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

£2.50

Aerosol Dust Spray

Ideal for removing dust & dirt from Keyboard & similar inaccessible spaces. **£3**

Spares for BBC Micro

UHF Modulator	**£4**	16MHz Crystal	**£2**
Speaker Grill	**£1**	17.734 MHz Xtal	**£2**
Speaker	**£3**	32.768MHz Xtal	**£1**
Keyswitch	**£1.50**	BBC B Refurbish	
Master PSU	**£59**	Casing	**£25**
Master Keyboard	**£62**	Keyboard	**£46**
Master Casing	**£49**	Power Supply	**£59**

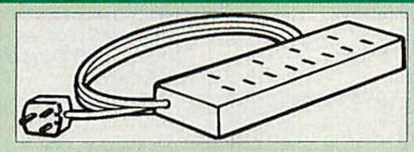
Replacement Flexible 17 way Keyboard Connector **£4**

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

£16

ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 Way DIP Switch

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

Connecting Leads

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 3 pin DIN Plug + 1 Jack Plug	**£2.50**
to 7 pin DIN Plug	**£3.00**
to 3 Jack Plugs	**£2.50**
6 pin DIN to 6 pin DIN Plug (RGB)	**£3.00**

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	**50p**	**75p**
RS423 (5 pin Domino)	**70p**	**80p**
Cassette (7 pin DIN)	**40p**	**95p**
ECONET (5 pin DIN)	**35p**	**50p**
Paddles (15 pin 'D')	**150p**	**250p**
Disc Drive Plug 4 way	**100p**	–
6 way Power Connector	**120p**	**150p**

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK **£8**

CHIP SHOP

1 MB-10 DIL D-RAM	**£4.50**
1 MB ZIP D-RAM	**£4.90**
256K x 4-8 DIP	**£4.75**
256K x 4-8 ZIP	**£4.80**
DS3691	**£4.50**
DS88LS120	**£5.25**
LM324	**£0.45**
SN76489	**£5.50**
SAA5050	**£8.75**
UPD7002	**£6.00**
2764-250nS	**£3.00**
27128A-250nS (12V5)	**£2.50**
27128-250nS (21V)	**£4.00**
27256-2	**£3.00**
27512-2	**£4.50**
27C101G (1 Meg)	**£7.00**
4013	**75p**
4020	**£1.00**
4164-10	**£1.55**
4464-10	**£3.50**
4816 RAM	**£2.00**
41256-8	**£2.00**
41256-10	**£1.50**
6264LP-8K	**£4.00**
6502A CPU	**£5.00**
65C02 3M	**£9.75**
65C12	**£9.00**
6512A	**£10.00**
6522	**£4.00**
6522A	**£5.00**
62256ALS-15	**£10.00**
62256P-12	**£8.50**
6818	**£4.00**
6845SP	**£6.00**
68B50	**£2.95**
68B54	**£7.50**
7438	**50p**
74LS00	**50p**
74LS04	**50p**
74LS10	**50p**
74LS123	**£1.00**
74LS163	**£1.00**
74LS244	**£1.00**
74LS245	**£1.00**
74ALS245	**£2.75**
74LS373	**£1.00**
74LS393	**£1.00**
75453	**£1.00**
75159	**£3.00**
9637	**£2.00**
ICL7673PA	**£3.00**

Assorted ROMS

ACORN ADFS	**£25**
ACORN BASIC 2 plus User Guide	**£22**
Acorn BCPL	**£42**
ACORN DNFS	**£17**
Acorn FORTH	**£32**
Acorn Graphics	**£25**
Acornsoft C Disc	**£36**
Acorn LISP	**£19**
Acorn OS B+	**£25**
Acorn OS 1.2	**£14**
Basic Editor	**£24**
BBC PCB Designer	**£49**
Beebmon	**£22**
Buffer & Backup	**£20**
Communicator	**£49**
Dump Out 3	**£25**
EPSON NLQ ROM	**£25**
Graphics Extension Rom	
GXR-B	**£21**
GXR-B+	**£22**
ICON Master	**£28**
Logotron LOGO	**£43**
MASTER OS ROM	**£38**
Master ULA (47)	**£15**
Master ULA (60)	**£10**
Micro Prolog	**£25**
Microtext Disc	**£46**
Microtext Rom	**£199**
NLQ DESIGNER	**£25**
Numerator – Archi	**£69**
Numerator – BBC	**£39**
Pendown ROM	**£32**
Rom Manager	**£20**
ROMIT	**£29**
SERIAL ULA	**£13**
TED	**£35**
Termulator B, B+	**£28**
Termulator Master	**£32**
Video ULA	**£14**
ULTRACALC II	**£26**
1Mb OS ROM	**£39**

Hi-Speed, Low Cost Archi Hard Disc Drive

Watford's NEW Innovative IDE interface card brings the latest advances in PC hard disc technology to within reach of the Archimedes user. Because of the integration of the controller and drive electronics onto one compact board, Watford Electronics have been able to include extra features into the drive, such as Caching, where tracks are buffered in fast memory, reducing access times and increasing throughput. All these benefits make IDE drives far more attractive than conventional ST506 drives or SCSI.
Watford's advanced interface allows IDE drives to work on any Archimedes machine, speeds in excess of SCSI devices can be obtained at a fraction of the cost of a SCSI drive.
Up to four drives are supported by the IDE filing system IDEFS, up to two drives can be attached to each expansion card, up to four cards can be installed in a machine. An optional 20Mb or 40Mb hard disc can be supplied on the podule expansion card itself, with its fast transfer rate and power saving modes the drive is ideal for storing commonly used software such as the !Fonts application.
A powerful security feature has been provided with the two unique commands *IDELock and *IDEUnlock, ideal for educational establishments where hacking or tempering may be prevalent that may lead to loss of data. Once locked, the configuration can not be changed until a secret password is used. The !IDEForm Write Protect option is particularly useful in conjunction with *IDELock as it will prevent any unauthorised deletion of data.
By an innovative use of on-board memory, the card will remember its configuration, even if moved to another slot or even a different machine, this also includes the unique security features.

Hardware

- Single width EuroCard
- Supports proposed ANSI ATA (IDE) specification
- Fast 16 bit MEMC interface interrupt driven to support background disc operations
- 5 Mbytes per second peak transfer rate
- Built in Non Volatile RAM to hold configuration
- LED activity indicator
- 37 way D type socket for external drives
- Optional on-card 20Mb or 40Mb hard disc
- Up to two drives (master and slave) per card
- Multiple cards per machine (up to four)

Software

- Conforms fully to the Acorn IDE Specification
- All software supplied in ROM
- Filing system 'IDEFS'
- Desktop filer with drive ready detection and disc name under icon
- !IDEForm, WIMP based configuration and formatting software
- Drives can be individually write protected
- Up to four drives over multiple cards
- Power saving standby modes supported with configurable timeout
- Drives can be used without translation in native mode for minimum overhead
- !IDEFSDisk, creates PC emulator hard discs

*Commands

*IDELock
*IDEUnlock
! DEFS
Selects the IDE filing system 'IDEFS'.
*IDEDrives
Displays the configuration and native characteristics of installed drives.
*Configure IDEFSDirCache
*Configure IDEFSBuffers
*Configure IDEFSDrive

Typical transfer speeds

Prairie Tek	20Mb	650K bytes per second
Seagate	43Mb	800K bytes per second

Prices

Part No.	Capacity	Access Speed	Price
ADA 0520	44Mb	28mS	**£249**
ADA 0530	100Mb	16mS	**£379**
ADA 0570	200Mb	15mS	**£499**
ADA 0580	330Mb	15mS	**£895**

All the above 3.5" hard drives are supplied complete with Controller Card, cable & Software on ROM. (Internal fitting). For use with A300/A400/A500 series machines.

For A3000 users an additional external Case and PSU will be required.

AAA 0300 External Case & PSU for A3000 **£85**

Internal Hard Disc Drives for A3000

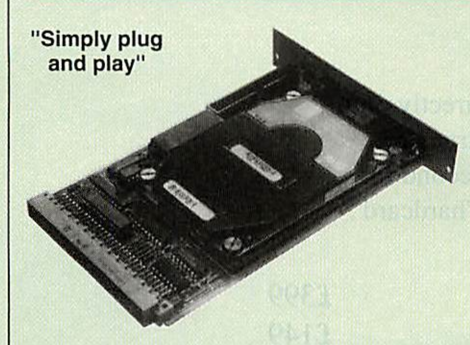
State of the art, 4 layer internal IDE Hard Cards for the A3000. Software supplied in, On-board ROM.

ADA 0700	21Mb	23mS	**£185**
ADA 0720	44Mb	19mS	**£385**
ADA 0750	60MB	18MS	**£425**
ADA 0730	89Mb	18mS	**£685**

Supplied ready assembled. No soldering required. Simply plug into the alloted space.

Archi IDE Hard Cards

"Simply plug and play"

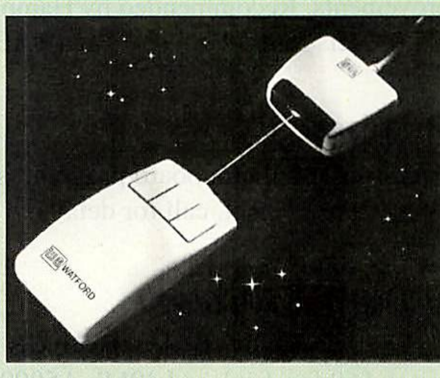


Watford's NEW low cost, high performance revolutionary IDE Hard Cards for the A300 and A400 series Archimedes are unbelievably easy to install – you simply slot one into any vacant podule backplane slot in the rear of your computer. These stunningly engineered, light weight but fast, 2.5" miniature hard drives are mounted onto the professionally designed cards, and are supplied with the fully Acorn-conformant IDE Filing System ready installed and ready to run. A novel feature of the hard cards is that they can be easily removed and transported to another Archimedes, for example to make a hard disc backup, or to transfer saved files from work to home etc. Security of files on the hard disc is ensured by our unique security password lock, which allows files to be read only, but not overwritten or deleted – ideal for use in school applications where the integrity of your master software needs to be retained.

ADA 0650	21Mb	23mS	**£199**
ADA 0660	44Mb	28mS	**£375**
ADA 0670	89Mb	18mS	**£675**

(Can be used as a Removable Hard Drive)

NEW Archimedes Cordless Mouse



Ever found that using a mouse on a busy desktop has its problems? The cable is always being caught up in papers, tangled round equipment and other cables etc, and what about that cup of coffee spilled over your work!

Watford Electronics' new Cordless Mouse solves these problems by removing the cause for concern - replacing the cable with a simple infra red link. It still provides all the speed and easy control of a conventional mouse, but with complete freedom. In use, there are no operating differences between the standard mouse and the new cordless mouse so all mouse functions and mouse driven RISC software will be fully compatible. Pinpoint accuracy is ensured by a unique Accelerator button, which, when pressed, moves the pointer by just a tiny amount for a large slow movement of the mouse, but by a large amount for a quick wizz of the mouse.

Features

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- High Resolution 200 DPI
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Watford Electronics

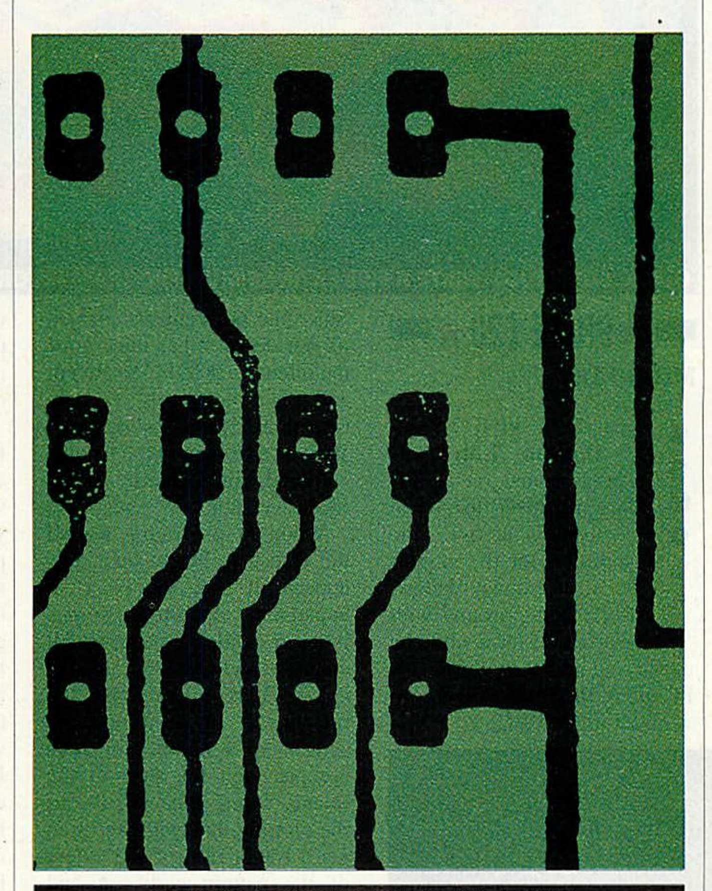


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★INFO

DAVE ACTON and **DAVE LAWRENCE** deliver their monthly mix of bits and pieces for your eight and 32-bit machines



COMPATIBILITY KEY	
B	BBC B compatible
B+	BBC B+ compatible
M	Master compatible
C	Master Compact compatible
E	Electron compatible
A	Archimedes compatible
A3000	BBC A3000 compatible

★PRIZE £20★

GRIDLOCK

B B+ M C E A A3000

Paul Pibworth of Gloucester has sent in a handy printer utility. It uses graphics mode to print out tables or grids to your own specification. You are asked if the grid is continuous or spaced – the latter means that there are gaps between some, or all, of the vertical columns. If there are gaps you are asked for the start and end points in inches of each horizontal line.

If the table is continuous this is simply the left and right hand edges of the table. Next you must enter the number and position of the vertical and horizontal lines. The table is then printed.

Paul says the program is not truly 'finished' – values out of range are likely to crash the program; inputs are in inches only; there is no load or save option and no Archimedes desktop version. (But isn't that what *Draw* is for? Ed.) Even so, the program is both handy and concise.

★PRIZE £20★

COUNTER INTELLIGENCE

A A3000

If you have ever watched a quiz show called *CountDown*, on Channel 4 then this submission from **Michael Rozdoba** is for you. His *Numbers* program solves the *CountDown* 'numbers game'. In this a contestant chooses a total of six unseen numbers from two random selections – one containing 'large' numbers (25, 50, 75 and 100) and the other small numbers (1 to 10). The *CountDown* computer, affectionately known as Cecil, selects a random target number up to 999.

Both contestants then have 30 seconds to combine as many of the initial numbers as they need with the elementary arithmetic operators (+, -, * and /) to get as close as possible to the target.

No numbers may be used twice, although not all six need be used. The resident statistician, Carol Vorderman, invariably does better than the contestants, but Michael's program, equally affectionately known as *Richard*, invariably does better still. When run, *Richard* asks for the initial numbers and the target to be entered, so you can play along with the quiz on TV.

Richard works by brute force, although he does exhibit some minor intelligence by trying all possible combinations of the six initial numbers and four arithmetic operators. The process can be thought of as moving up and down the branches of a tree – any particular path from the base of the tree to the tip constitutes a particular combination of the numbers and symbols.

The intelligence comes in when *Richard* prunes certain branches of the tree which he decides are wasteful. For example, if the current calculation yields a negative number the following branch is chopped off. Similarly the operators + and * are only applied if the first operand is greater or equal to the second. This prevents the results being duplicated all the way along two separate branches.

Although *Richard* often takes longer than 30 seconds to check all the possible combinations (on an Arm2 machine at least), it usually seems that when an exact solution exists there are several

★INFO COMPATIBILITY TABLE

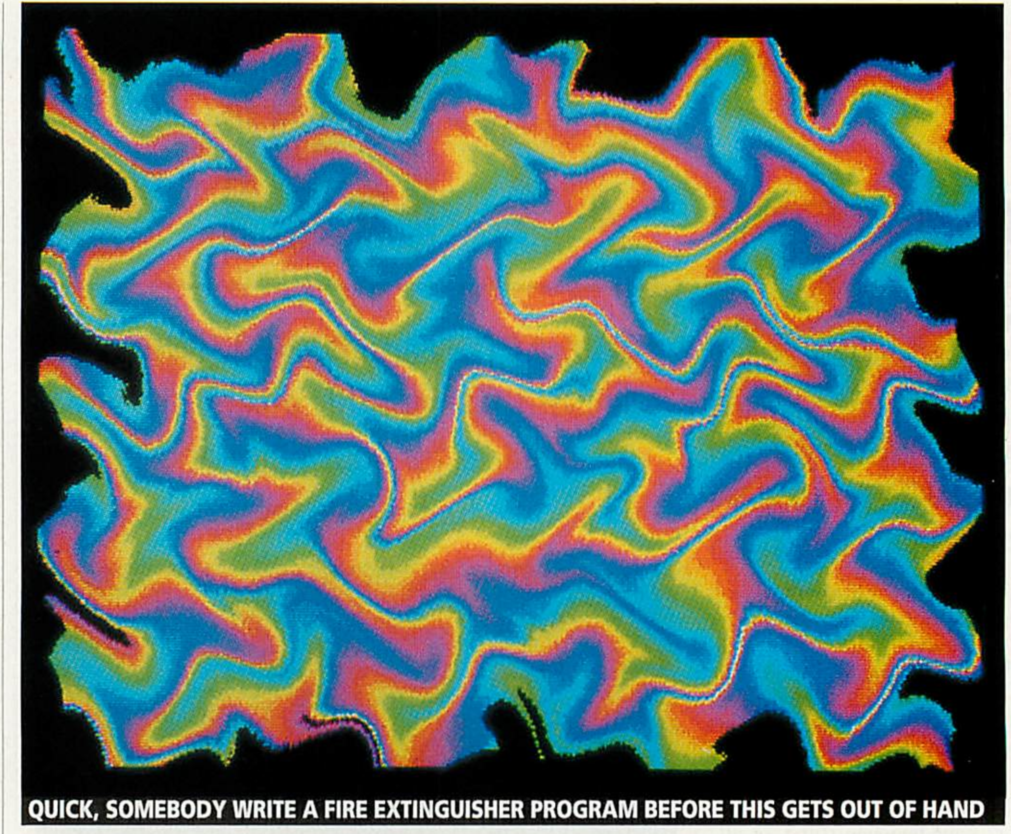
LISTING	NAME	BBC B	MASTER	ELECTRON	ARC
Info 1	GridMaker	★	★	★	★
Info 2	CountDown				★
Info 3	MicroArt32				★
Info 4	MicroArt8	★	★	★	★
Info 5	Fire32				★
Info 6	Fire8	★	★	★	
Info 7	Henon				★
Info 8	Handy32				★
Info 9	Handy8	★	★	★	
Info 10	Predictor	★	★	★	★
Info 11	Bugland				★
Info 12	Spikes32Arc				★



other solutions, so *Richard* will invariably find one within the time available. As the program runs it outputs the calculations for the 'best so far' solutions which lie within 10 of the target. If it finds an exact solution it terminates with a report on the time taken. *Richard* can be terminated via SHIFT ESCAPE.

It would be nice to say that if *Richard* cannot find a solution then one does not exist. Michael admits that he's not certain about this, saying: '*Richard* only works with integer numbers, so if a division produces a fractional answer the following branch is pruned off. Although there are some solutions which involve an intermediate fractional calculation, I have never seen a problem where the only solutions which exist require fractions. I don't think this can happen and, if this is true, you can be certain that when *Richard* tells you it can't find an answer, one doesn't exist. However, as yet this conjecture remains unproven and unless you can find an example that proves otherwise, or a bored number theorist who can prove it, it will remain one of the mysteries of mathematics.'

We would like to have carried an eight-bit version of *Numbers*, but the sheer scale of the problem defeated us this month. We are sure that at least one clever reader will be able to provide a Beeb solution – if that reader is you, then we'd be happy to include your


QUICK, SOMEBODY WRITE A FIRE EXTINGUISHER PROGRAM BEFORE THIS GETS OUT OF HAND

★PRIZE £20★

MICROART

B B M C E A — Recently, a ★INFO regular **Duncan Lilly** was rooting around on a PC magazine cover disc when he came across the inspiration for the graphical ditty shown below. After playing around with the program for a while he added colour, then threw his PC out of the window and converted it to the BBC.

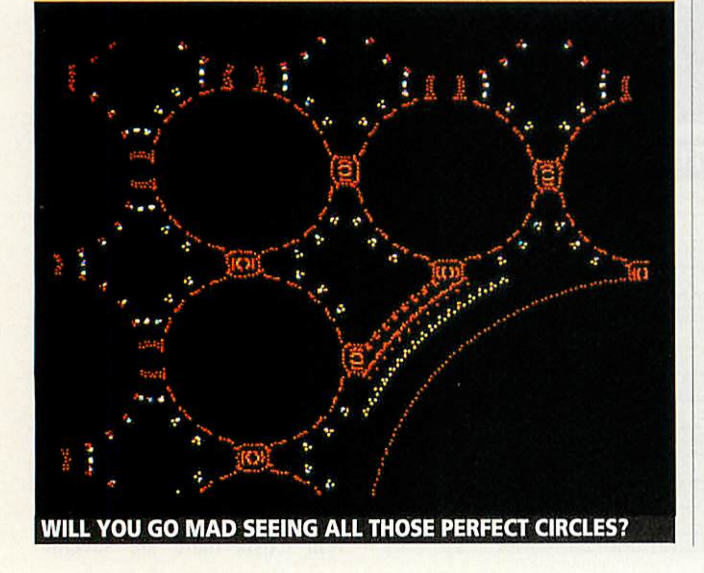
Since the program has arrived on our desks, it has undergone the intensive ★INFO treatment and so it now only vaguely resembles Duncan's original. We've also penned a multi-coloured, multi-palette Archimedes version.

When the program is started the screen is black, then dots appear all over the place in apparently random positions. After a while a pattern will emerge and slowly change colour. It is unlikely that the image will fit neatly on the screen, so a number of keys are provided for shifting the image. Doing this will restart the plotting, but you can often get a rough idea of the extent of the pattern early on and reposition it as necessary.

Cursor keys move the image in the corresponding direction, + and - increase and decrease its size, < and > rotate it. Additionally, SPACE chooses new (random) parameters and starts a new pattern. Two methods are used for determining the colours plotted: by default, plotting a point will increase its brightness (the palette is arranged in brightness order); if you change to cycle (by pressing C) each colour will be used for a random number of points before moving on to the next colour. Incremental mode can be reselected by pressing I.

The Archimedes version has four built-in palettes. By default a simple black and white one is used which allows you to find a good pattern and position it correctly on the screen. Keys 1-3 select the other palettes – 1 is a 16 shade grey scale, 2 a progression from blue through white to red and 3 a colour spectrum (0 is the black and white one). As with the BBC version you can Increment or Cycle the colours. Extra palettes can easily be added by providing a list of 256-colour mode colour byte values in data statements at the end of the program. Each list is terminated by having two numbers the same, so there is no 'next' colour.

The program is very similar in operation to a one-liner carried in *Risc Revue* many months ago: x and y are initialised to zero, then a couple of functions are iterated on them and the results plotted each time. Most of the program is taken up processing key presses, but it is very simple and very pretty.


WILL YOU GO MAD SEEING ALL THOSE PERFECT CIRCLES?

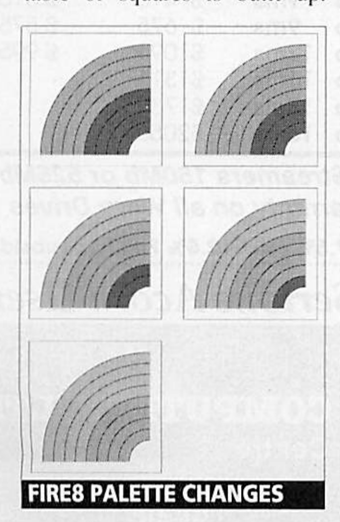
★PRIZE £20★

FIRE-ARM

B B M C E A You may remember the striking effect produced by the *Gwawp* program (*BAU* June 1991). Dave Lawrence's original program used Arm code to create the whacky patterns, but **Jan Vibe** has sent us a remarkable piece of Basic (yes, you really can write graphic demos in Basic) which produced the striking result shown on page 50. *Fire32* works by plotting, then distorting, a set of concentric circles.

The distortion takes the form of stretching the rings horizontally or vertically according to a randomly chosen sinusoidal pattern. The Basic command RECTANGLE FILL TO is used to move a single column or row of pixels the required amount. Note that horizontal distortion is much quicker than vertical, not only because there are fewer rows than columns, but also because the rectangle move can be done in words rather than bytes of memory. In all, six distortions are applied in each direction and the result is a fiery pattern that is animated by changing the palette.

If you have an eight-bit machine you can experience a similarly dramatic display by running *Fire8*. This uses mode 2 which, although rather chunky, provides 16 colours. The circle plotting is done using some fairly crude though effective machine code. A table of squares is built up.



FIRE8 PALETTE CHANGES

Then each pixel has its distance from the centre of the screen calculated using this table. A colour is chosen according to the distance, so concentric rings of sequential colours are built up. Only colours zero to 14 are used – colour 15 is reserved for the black that is introduced around the edges after distortion.

Two machine code routines are included for quick distortion – shiftcol and shiftrow respectively move a column or row of pixels a specified amount (passed in A). Colours are alternated by changing the palette – just as *Fire32* does. In fact they are changed in order to form four sweeping bands – magenta, red, magenta, white. *Fire8* below shows eight typical adjacent rings. These are plotted in colours zero to seven for example. At the outset, colours zero to three are set to green and four to seven to red. The next frame colour zero becomes blue, one to four are green and five to seven are set to red. As this process continues the green band has been replaced entirely by the blue and the red by the green.

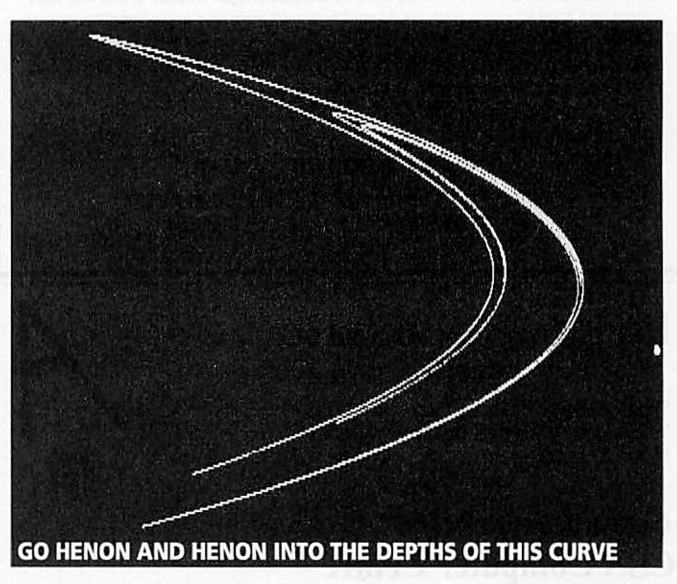
Each colour remains the same for four consecutive frames and this allows the animation to trick the eye more convincingly.

★PRIZE £20★

HENON AND ON AND ON

A Last November we issued a challenge to write a machine code version of Gareth Eley's *Henon* curve plotter. Well, four months on, and here's what we wanted. **Michael Rozduba** of Bedlington was been beavering away and come up with *Henon – the return*. On running the program, the curve is built up very quickly in the centre of the screen. Holding down the Menu button allows you to pan over the curve using the mouse. The Select button zooms in and the Adjust button zooms out.

The 'clever' bit is that the program only plots when you are not altering the image, so you do not have to wait for the zoomed image to be completely drawn before you can zoom or pan again.



GO HENON AND HENON INTO THE DEPTHS OF THIS CURVE

Michael managed to speed up the program quite dramatically by subtly altering the A and B parameters in the original. They used to be 1.4 and 0.3, but after a bit of experimentation, he found that 1.5 and 0.25 worked just as well and are much easier to work with in fixed point arithmetic in Arm code.

The resulting code can generate nearly 33,500 points per second – this is almost 20 times faster than Gareth's original version!

HANDY HINT

B B M C E A We recently had a request from **Richard Fortescue**, a *BAU* reader who has the use of only one hand. He explained that holding down SHIFT or CTRL with another key could be difficult and sometimes impossible. Although CAPS LOCK (and on eight-bit machines, SHIFT LOCK) go some way to helping, a better solution was needed.

We have come up with two programs, for 32-bit and eight-bit machines. We hope they will go some way to helping users who may have similar special needs, but if you have a better solution or indeed any tips or programs that might help, we would be delighted to publish them.

Handy32 is the Archimedes version and the small Basic program assembles a module called *Handy*. This, when loaded, provides two commands – *HandyOn and *HandyOff – used to turn the special SHIFT and CTRL facility on and off respectively.

When on, a single press of SHIFT or CONTROL will cause the next keypress to behave as if SHIFT or CONTROL were held down at the same time. Any keys may be SHIFTed or CTRLed in this way, including function and cursor keys. You may apply SHIFT and CTRL to a subsequent keypress by pressing them in order.

The short Archimedes solution is made possible by two features unique to the 32-bit machines. Firstly, an event occurs when a key is pressed or released and this can be trapped to keep a note of when SHIFT and CTRL are pressed. Secondly, an OsByte call (202 in fact) can be used to make the computer think SHIFT or CTRL are being pressed, even when they're not.

The eight-bit solution, *Handy8*, is a little more involved. It assembles a short piece of code at &900 which is saved as *Handy*. To install the code simply *Run Handy. Do not install it twice. Again, SHIFT and CTRL take effect on any subsequent keypress. Incidentally, with both versions of the code you can cancel a SHIFT or CTRL simply by pressing the same key again.

Although OS_Byte 202 is available on the Beeb and other eight-bit machines, it is only really useful for setting



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the state of CAPS LOCK and SHIFT LOCK. Bits can be set for SHIFT and CTRL but it seems that the operating system resets them whenever GET or INKEY is used.

Also, there is no key up/down event, so we are really quite stuck. The solution, although inelegant, goes as follows. The vertical sync event is trapped which calls a routine of ours 50 times per second. Each time, the CTRL and SHIFT keys are examined by calling the key vector KeyV and their state is noted. The two calls OS_Rdch (used by Basic GET) and OS_Byte 129 (used by Basic INKEY) are also intercepted.

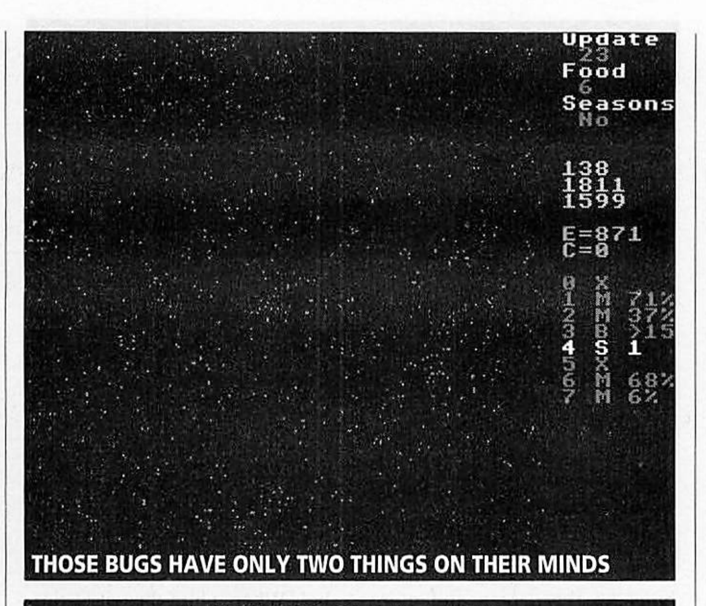
The operating system routines for OsRdch and OS_Byte 129 are called by our code which then modifies the characters returned depending on whether SHIFT or CTRL preceded the keypress. This is a fiddly process, and required look-up tables, but it works well enough.

Because the eight-bit solution is not 'official' in the way that the Archimedes version is, it cannot be guaranteed to exactly emulate true SHIFT and CTRL. Programs that detect keys other than by GET or INKEY, or use INKEY with a negative value to directly check SHIFT or CTRL will not work. The Archimedes version will always work since the proper OS_Byte call behaves as it should.

★PRIZE £10★

YOU'RE A WINNER

A short, but potentially money-spinning offering, comes from **Robert Place**. It's a pools prediction program. Robert claims to have had some success using his listing, so why not give it a try – and tell us if you win a fortune! *Predictor* (not to be confused with a commercially available product of the same name) asks for two team names and details. These include league position, number of games played and won, and the number of goals conceded. Ratings are calculated for each team and the expected outcome – win or draw – is displayed. Currently no distinction is made between score and non-score draws, so perhaps an interested reader might like to enhance the program. Please make cheques payable to...



THOSE BUGS HAVE ONLY TWO THINGS ON THEIR MINDS

THE LAWS OF BUGLAND

Bugland Genetic Code

TURN x% – Turn to a random direction with an x% chance

LOOP n off – If counter is zero, set it to n and branch back off instructions. Otherwise, decrement the counter. If zero, proceed otherwise branch back off instructions.

BREED e – Breed if energy level is greater than e*64

ENERGY i – If energy level<256, jump to instruction i

SEE i – If food can be seen, jump to instruction i

JUMP i – Jump to instruction i

MOVE x% – Move forward with an x% chance

XA – spare gene that does nothing

A designer bug

0 MOVE 96%
1 SEE 0
2 BREED >28
3 TURN 31%
4 JUMP 0
5 JUMP 0
6 JUMP 0
7 JUMP 0

An intelligent life form that evolved

0 MOVE 62%
1 LOOP 5 6
2 JUMP 6
3 BREED >20
4 MOVE 18%
5 MOVE 65%
6 SEE 3
7 TURN 65%

MORE BUGS

Last month we brought you **I. Reeve's** *Bugworld*, the most adventurous evolution program yet. This month we present *Bugland*, a fast Arm code version that takes things a stage further. The basic principles involved in *Bugland* are very similar to the original *Bugworld* and full credit for the originality of the idea must go to Mr Reeve. Basically, individual organisms or 'bugs' have genetic patterns that take the form of simple programs which control how the bug behaves. *Bugland* bugs have programs consisting of eight genetic instructions and each instruction can be one of eight types. As in *Bugworld*, when bugs breed there is a chance that their offspring will mutate and some mutations will be better equipped for survival than their parents.

Before explaining how *Bugworld* works, I'd recommend you simply play with it for a while. The world consists of a 256 x 256 grassy area. At the outset, 50 entirely 'random' creatures are created and placed at random locations. They are random in the sense that their genetic programs consist only of eight randomly chosen numbers. Most of the genetic programs will be nonsense and many of the initial population will simply stay still and die out, others will have some form of urge to move and will thus find food and live longer, while others may still have an urge to breed – and this is where the possibility of evolution lies. From quite stupid ancestors, relatively intelligent creatures can soon come about.

Bugs are shown as single dots (for speed more than anything). When a bug has children they are of a different colour if mutation has occurred. On the right is a simple menu: select an item with the up and down cursor keys and alter the value/state with left and right.

SHIFT can be pressed for more rapid changes. The update rate is how often you view *Bugworld*: a rate of one means you see every move, a rate of 30 means you only see a snapshot every 30 moves. Alter the value to 'fast forward' evolution, or slow it down for closer inspection.

The food rate is simply how quickly the grass grows. You can switch 'seasons' on by selecting the third option on the menu. In this case the food value is a mean for a 'bug year' and the actual grass-growing rate rises to a peak in the summer and falls to a low in the winter.

Seasons can be used to enhance and even accelerate the evolution rate. A harsh winter is a good way of sorting out the bugs from the buglets! Three numbers below the menu show the food rate, the number of bug moves starting from zero (time), and the population. which has an arbitrary limit of 4096 .

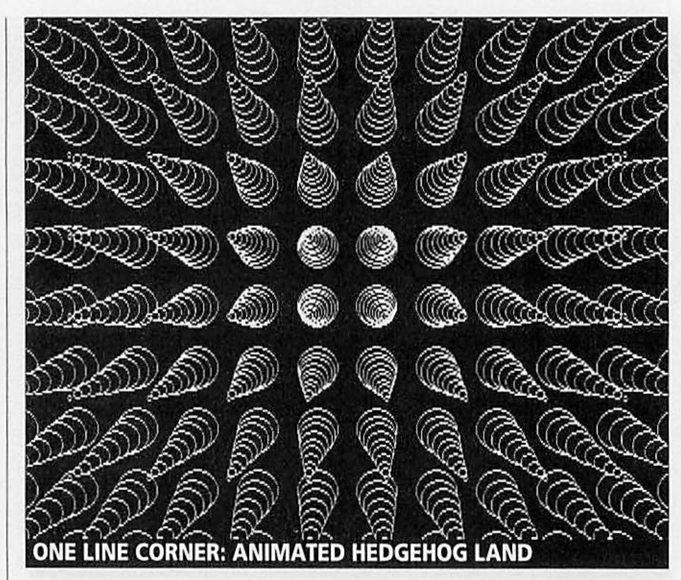
Click on a bug with Select and a white circle will appear around it. The program of the chosen creature is shown on the right with the current instruction highlighted. Slow the update speed to one and hold down CTRL or CTRL and SHIFT to follow the program more carefully. You can also place your own designer bugs by clicking on *Bugworld* with



Adjust. The table on page 53 shows my own designer bug's program, but you can easily adapt it yourself.

Bugland differs from *Bugworld* in several respects. Firstly, the rules are a little simpler. Each genetic instruction consists of a one byte code – three bits of this make up the instruction type, the remaining five are data. Figure one lists the valid *Bugland* genes and, since each one-byte value is a valid gene (however stupid), mutation can be simplified and indeed, *Bugworld* bugs mutate by one or more bytes of their program being changed to random values.

Other factors are simplified – mutation occurs with a fixed probability for example, and all the bugs are vegetarian! It would slow the program down quite a lot to add extra factors, but feel free to try. The reason I haven't done so is because of the main difference between the two programs – namely speed. Typically, 100 or more 'moves' may occur per second, more if there are few


ONE LINE CORNER: ANIMATED HEDGEHOG LAND

bugs on the screen and more still, if you are lucky enough to have an Arm3.

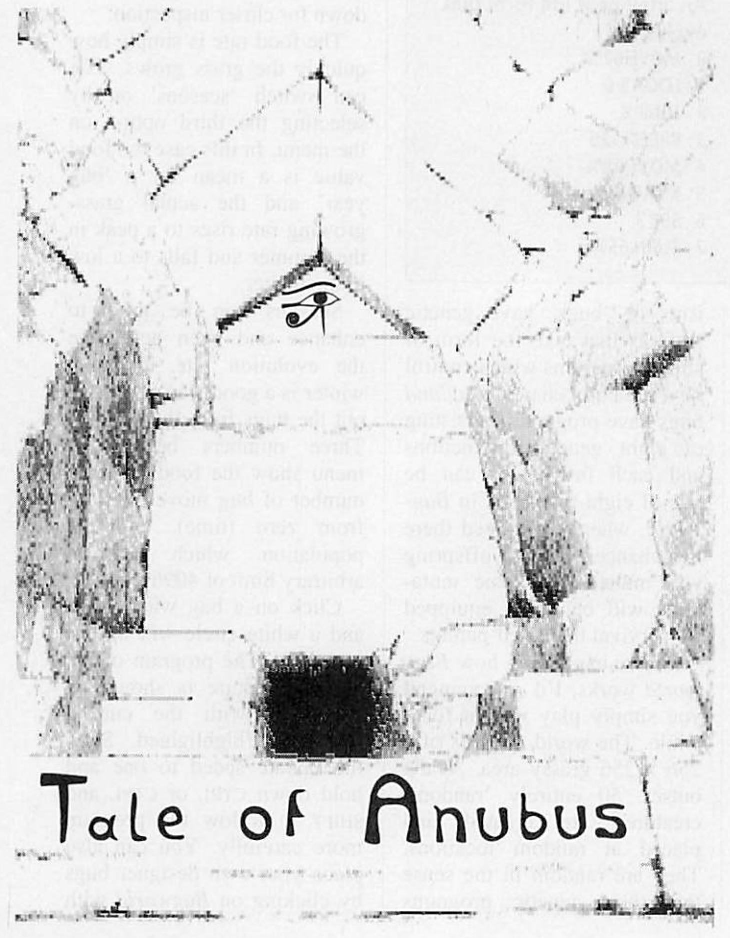
Often, major examples of evolution occur only after thousands of moves, so it is vital for the program to operate quickly. Many tricks are employed to increase the program's speed. Bugs are stored in the form of a linked list – a similar list exists for 'bugs to be'. When a bug dies, it is simply patched out of the list and its workspace is patched in to the free space list. The reverse of this happens whenever a new bug is born.

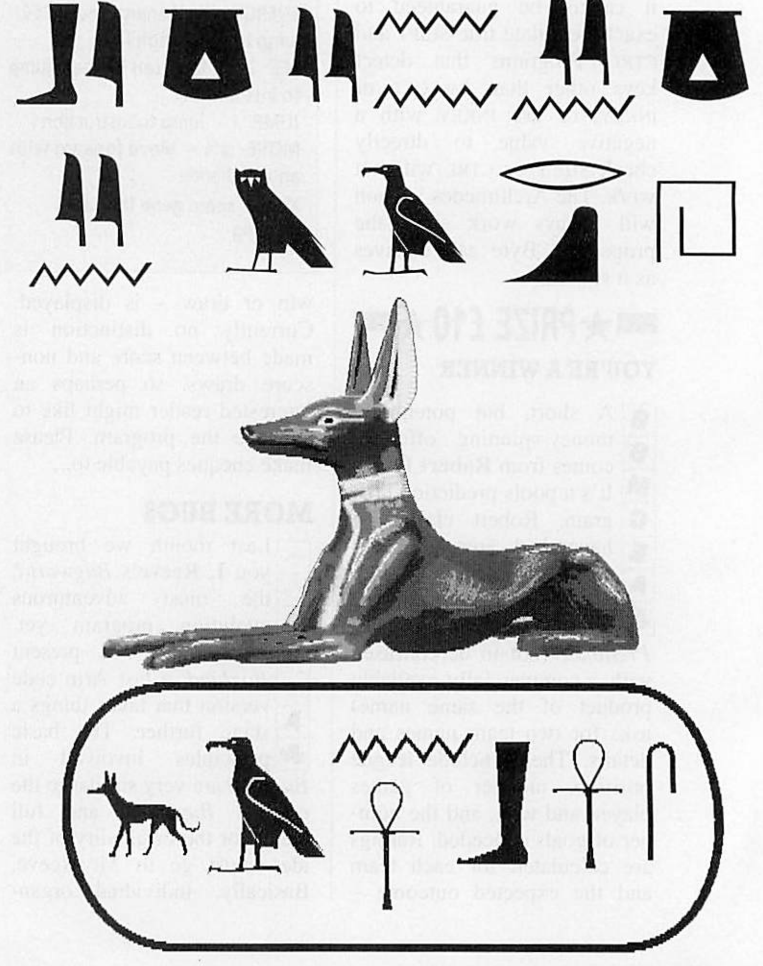
Another difference from *Bugworld* lies in the fact that breeding is now controlled by a gene. Some bugs may evolve early on and survive to a great age without being able to breed. On the other hand, when food is plentiful, waves of mutants who have nothing but breeding on their little buggy minds can sweep across the screen.

The table on page 53 shows the designer bug's program. Basically it moves forward rapidly to find food – when it can't see any, it turns occasionally and when strong enough will breed. This is quite a successful program and if you introduce these to the world at an early stage, the designer bugs soon take over. However, after only a few thousand moves other bugs often evolve that are even more successful.

Figure four shows the program of a bug that evolved after 28,000 moves. It is difficult to see why this natural bug is more successful than the designer one, but in a competition for food the natural bug wins!

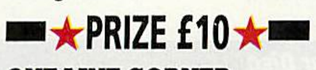
The question is: are we seeing the evolution of true intelligence? Yes, since the evolved solution to the prob-





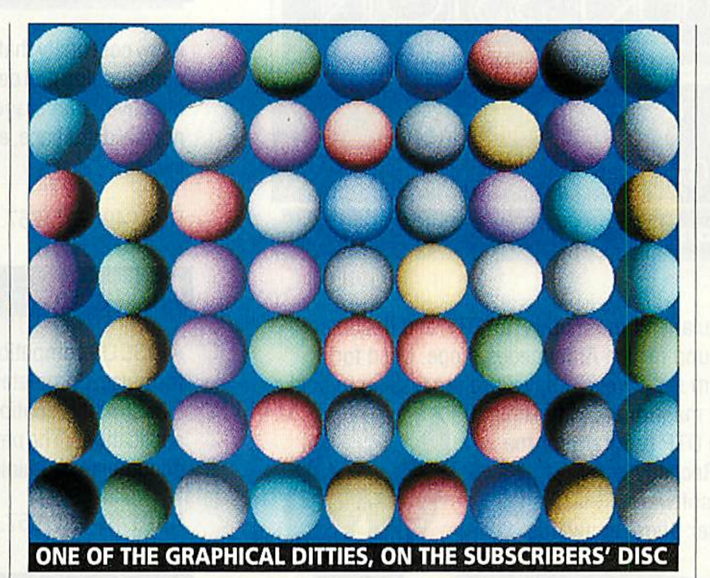
lem of survival works better than the man-made one. On the other hand, *Bugland* suffers from the same problem that all evolutionary programs have – foresight. True evolution has no idea where it's going – it simply goes.

Take eyesight, for example – our eyes have developed over billions of years, so it's not surprising that we have to give our program the advantage of a pre-designed sight gene to hurry things along. We are also limited by population – compare 4096 computer bugs with a whole planet full of organisms.



ONE LINE CORNER

There is only a single Archimedes one-liner this month, but it's a good one, again from **Jan Vibe.** You'll need 160K of screen memory to run it and in this it builds up eight complete mode 0 screens which are then animated. The result is quite surprising and somewhat reminiscent of flying over the surface of a very large and particularly painful looking morning star!


ONE OF THE GRAPHICAL DITTIES, ON THE SUBSCRIBERS' DISC

***DISC**

This is a new section for ★INFO. As we have mentioned recently, we are hoping to carry a few extra programs on the monthly subscribers' disc. In general these will be large 32-bit desktop applications – too long to sensibly list on the yellow pages. We won't ever go into too much detail explaining the programs on these pages, instead help will be given on the disc. To start the ball rolling, we have an auto program 'backing up system' from **Brian Higgins** of Dublin – read *!Help* for more information. Not only is this a 'large desktop application', it has also been written in C. All the source code is on the disc.

For non-programmers, there is a collection of ditties from regular button pusher **Jan Vlietinck**. These are programs we've wanted to print for quite some time but we never seem to have the space.

They are supplied as Jan sent them in, so apologies in advance for the non-*BAU* listing style. The purpose and function of these programs should be self explanatory.

***QUIT**

If you've written a program or just have a good idea, why not let us know? As we plan to include more 'extras' on the subscribers' disc, you can now send in all those long programs (especially Risc Os applications) that would strain both our yellow pages and your typing fingers. Please send your submissions on disc and with an sae to: ★INFO, *BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ.*

P R O D U C

SOFTWARE



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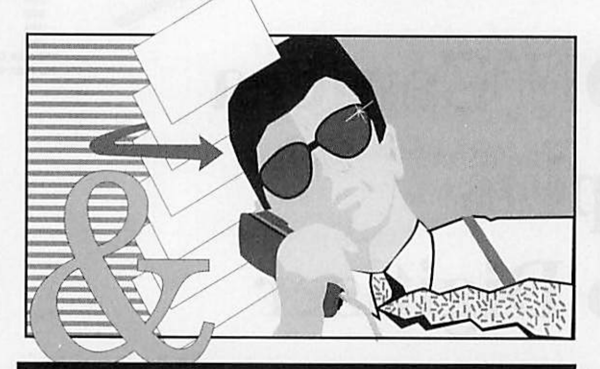


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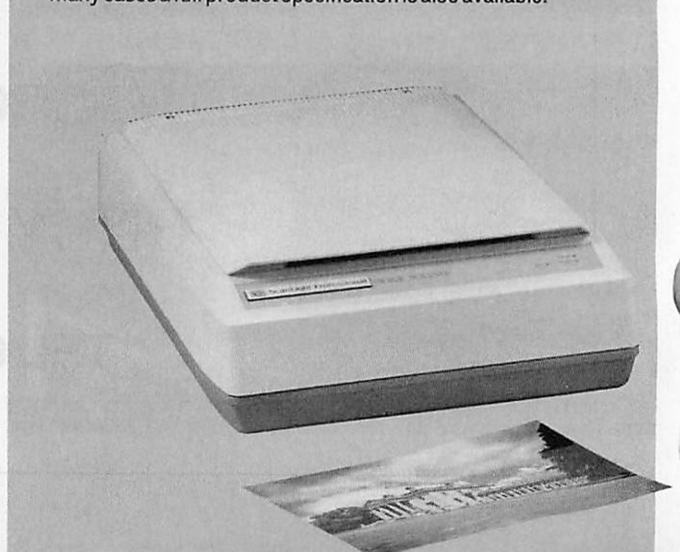
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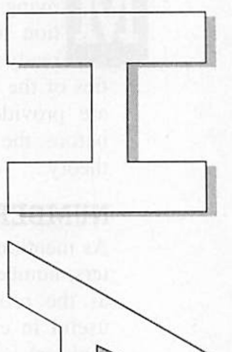
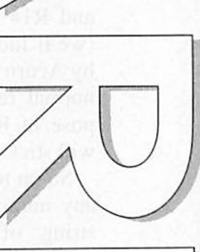
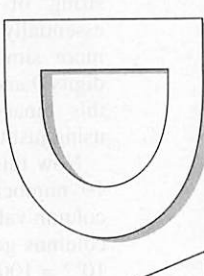
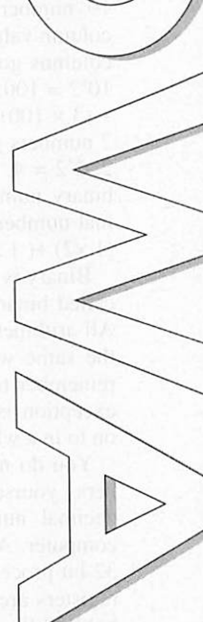
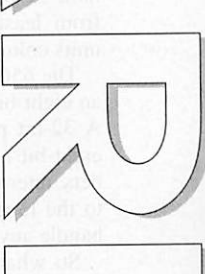
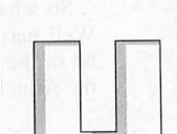
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In part two of our series on Arm programming DAVID SPENCE shows you how to deal with numbers

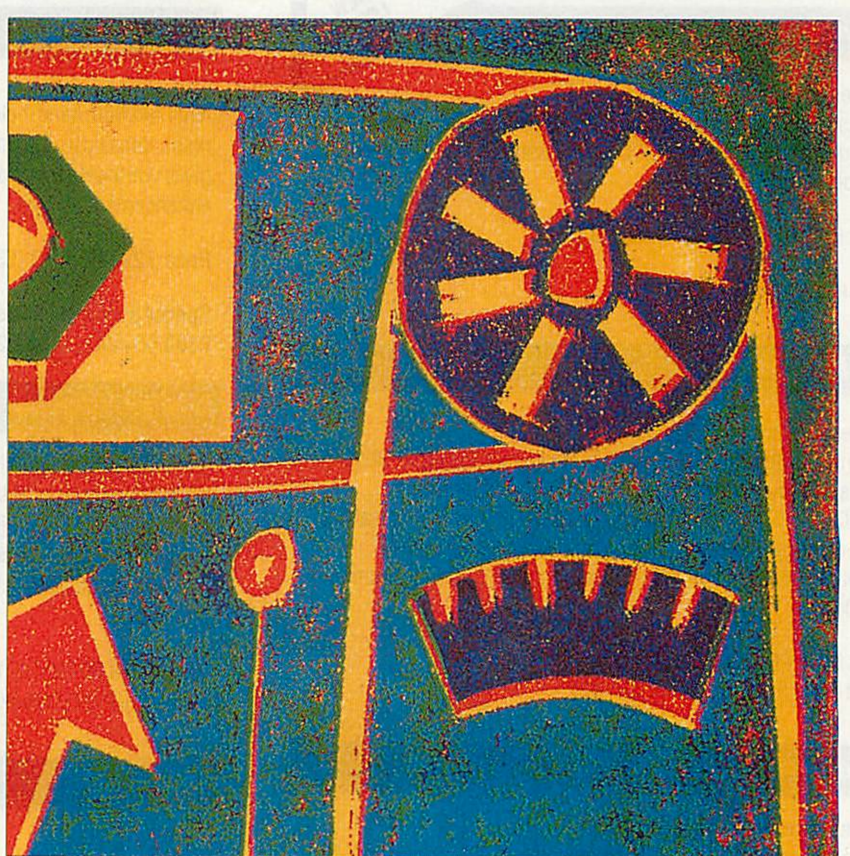


ILLUSTRATION BY PAUL SCHOFIELD

ASSEMBLY LINE

In part two of our series on Arm programming **DAVE LAWRENCE** shows you how to deal with numbers

Moving on from last month's broad introduction to Arm programming, you are now ready to learn about the arithmetic capabilities of the chip, in terms of the commands that are provided. But as always, I'm afraid that before the practice, there has to be a little theory...

NUMBER THEORY

As mentioned last month, the Arm has 16 registers, numbered 0 to 15. The last, R15, is known as the program counter and is not generally useful in calculations. Likewise, R14 (the link register) is semi-dedicated and is not normally used by the programmer. I also said that R13 is out of bounds, although this is not strictly true.

The purpose of R14 and R15 is fixed, by the Arm chip – you cannot alter their functions in software – R15 is always the program counter and R14 is always set up by a BL instruction (we'll look at this next month); R13 is defined by Acorn to be the stack pointer and is just like a normal register. However it has a special purpose in Risc OS. For the moment though, we will stick to using the registers R0 to R12.

So on to numbers. Normally, we can represent any number we like by simply writing down a string of decimal digits. Computers, being essentially dumb machines, like things to be more simple than that. They only know the digits 0 and 1, rather than 0 to 9. Computers use this binary system to represent any number using just two digits.

Now this is real primary school stuff. A base 10 number is represented by multiplying the column value by the number in that column. The columns go up in powers, 10^0 = 1, 10^1 = 10, 10^2 = 100, 10^3 = 1000. So 1320 is (1 × 1000) + (3 × 100) + (2 × 10) + (0 × 1). Similarly, base 2 numbers go up in powers of 2: 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^3 = 8, 2^4 = 16 and so on. So the binary number 10111 is converted into a decimal number thus (1 × 16) + (0 × 8) + (1 × 4) + (1 ×2) +(1 × 1) = 23.

Binary is therefore base 2 and its 0s and 1s are called binary digits or, more conveniently, *bits*. All arithmetic in binary is carried out in exactly the same way as in decimal, you just have to remember to carry 2s rather than 10s. The only exception is negative numbers which I'll come on to in a while... oops, I almost said bit then!

You do not need to know about binary numbers yourself, the assembler converts your decimal numbers into the 1s and 0s for the computer. As you may have heard, the Arm is a 32-bit processor. In this case, this means that the registers are 32 bits wide – in other words they hold 32 0s and 1s. These are numbered 0 to 31 from least to most significant, so bit 0 is the units column, bit 1 is the 2s column and so on.

The 6502 – the BBC Model B's processor – is an eight-bit processor and has eight-bit registers. A 32-bit processor is therefore 'better' than an eight-bit one because it can handle larger numbers internally: the 6502's registers are limited to the range of 0 to 255, whereas the Arm can handle anything between 0 and 4,294,967,295.

So what about those negative numbers then? Well here comes the bodge in binary. The top bit of the binary number is set (so in the case of the Arm, bit 31 is set to 1 if you are dealing with a negative number, 0 if it is a positive number). The remaining bits then represent the number.

Of course life is never quite that simple. The value of a negative number is not minus the-rest-of-the-bits. For a start you could have zero and minus zero using that system. Instead twos complement is used. You needn't know why it's called this, just how it works.

To make a binary number negative you change all its 0s to 1s and 1s to 0s and then add 1 to the result. Here are a couple of examples (as it is simpler, we have used an eight-bit processor in this example).

```
1 = 00000001
 -> 11111110 (0>1 1>0)
 +1 11111111 (=-1)
```

```
38 = 00100110
   -> 11011001 (0>1 1>0)
   +1 11011010 (=-38)

 0 = 00000000
   -> 11111111 (0>1 1>0)
   +1 00000000 (=0)
```

As you can see, when using this system -0 is the same as 0. The best way to visualise it is to imagine all the numbers from 0 to 255 (eight-bit processor again) written in a circle, 0 to 127 are always positive, 128 to 255 can either be 128 to 255 or -128 to -1 if you are using negative numbers. On the Arm, this system is identical except you can represent -2,147,483,648 (-2^31) to 0 to 2,148,483,647 (2^31-1).

INTO PRACTICE

Last month's example program only had two real Arm instructions, and one of those was an operating system call. The other was MOV. This is short for move and it takes two parameters, a source and a destination. MOV simply moves the source number to the destination. The destination must be a register, the source can either be a register or a number. For example, MOV R0,#42 will place 42 into register 0. Note that Arm instructions read in a similar way to Basic assignments with the destination to the left of the arguments (A% = 42). Given this, you should be able to work out these examples.

```
MOV    R1,#89
MOV    R2,R1
```

So, now that we can put numbers into registers, we need some means of manipulating them. Last month I mentioned that there are six instructions for addition and subtraction and two for multiplication. The two simplest of these are ADD and SUB and I'm afraid there are no prizes for guessing what these do.

Both take three parameters, a destination (as with MOV) and two sources. As indeed do conventional sums (A = B + C). The destination and first source must be registers, but the second can be a number as shown below.

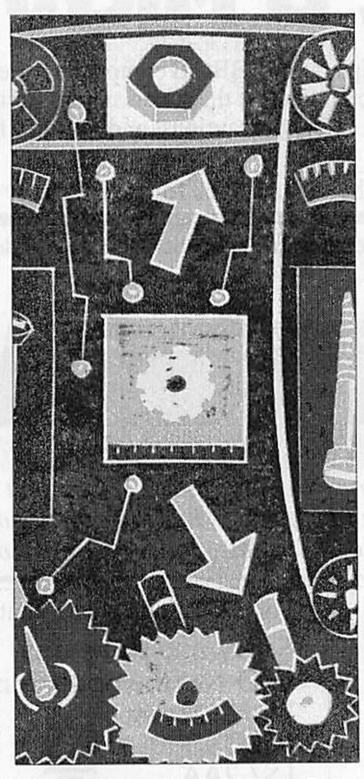
```
ADD R0,R1,R2   (R0=R1+R2)
ADD R0,R0,#1   (R0=R0+1)
SUB R1,R3,#4   (R1=R3-4)
SUB R7,R2,R3   (R7=R2-R3)
```

If I now tell you one clever Basic keyword, you can try these instructions out.

CALL and USR

Basic provides two methods of running machine code program. Last month you met CALL. If you typed CALL hello the demo was run. No data was passed back to you and so CALL behaved a bit like a simple procedure call. To get a value back from a piece of code, the simplest way is to use USR. This is more like a function as it returns a value which you can assign to variable or PRINT. If you use something like the following line result=USR(mycode) the machine code at mycode will be executed and at the end the contents of Arm register 0 (R0) will be returned to Basic and, in the example above, assigned to the variable result. To see this in action, try typing in listing one in the yellow pages.

You should recognise the initialisation and associated Basic blurb from last month's example, so I'll start at code itself. Line numbers are shown in the square brackets.



YELLOW PAGES

To find the programs mentioned in this article, turn to yellow pages, under the section entitled Arc Assembler. They can also be found on the subscribers' monthly disc.

Firstly, 5 is stored in R0 [130] and 9 in R1 [140]. These are then added together and stored in R2 [150]; 7 is added to R2 and the result put back in R0 [160]. R1 is then changed to 3 [170] and is subtracted from R0, the result being stored back in R1 [180]. Finally, R0 is decremented by 1 [190]. Remember that MOV pc,link returns the computer to Basic for us? If you work this out in your head you should come up with a value of 17 – run the program and press SPACE to see if your Archimedes agrees!

I am only going to introduce one more of the six simple instructions now. The rest will be revealed when I deal with big numbers later on in the series. This is RSB, or Reverse SuBtract. It is identical in operation to SUB except that the first source is subtracted *from* the second rather than the other way round. This allows you to subtract registers from constants which you cannot do with SUB as the first source must be a register. The following should make this clear.

```
RSB  R0,R1,R2 (R0=R2-R1)
RSB  R1,R3,#9 (R1=9-R3)
RSB  R0,R0,#0 (R0=-R0)
```

Try changing line 190 of the demo program to RSB R0,R0,#30 and re-running it. Is the result as you would expect?

Feel free to fiddle with this program as much as you like. For the moment avoid trying to load registers with negative numbers (it won't work) and stick to values less than 256. First thing next month I'll explain why, I promise! Intermediate results larger than 255, or less than zero, will cause no problems and the correct result should be printed at the end.

MULTIPLICATION

The multiplication instruction is MUL. As with ADD and SUB, it takes three parameters, however they must all be registers, so if you need to multiply by a constant, you have to load it into a register first. In addition, the first source register cannot be the same as the destination. So MUL R0,R1,R2 (R0=R1*R2) is valid, but MUL R0,R0,R1 (ERROR!) is not. The two sources can be same (thus squaring the number) and, of course, the second source can be the same as the destination.

```
MUL R0,R1,R0   (R0=R1*R0)
MUL R2,R4,R4   (R2=R4²)
```

The 'other' multiply instruction, is merely an extension of this. The MLA stands for MuLtiply and Add, and allows a third source register to be supplied. (It must be a register; there are no numbers allowed here.) This is added to the result of the multiplication before it is stored in the destination.

Listing two in the yellow pages demonstrates the use of MUL and MLA. R1 is set to 5 [130] and R2 to 9 [140]. These are multiplied and stored in R0 [150]. R1 and R2 are set to 2 and 10 respectively [160 and 170]. The previous result (R0) is multiplied by R1; R2 is added to the result and the total is returned to R0 [180]. The final sum is: (5 × 9) × 2 + 10 = 100. As with the previous example, please feel free to experiment with the numbers given. As before steer clear of negatives and numbers greater than 255.

Next month, we'll look at the barrel shifter, and, no, it's not some kind of fairground ride...

SETTING STANDARDS

Epson is ensuring the survival of dot-matrix printing by introducing a new standard code. **MALCOLM BROWN** investigates

Don't be fooled into thinking that dot-matrix printing is dead. While most of the attention these days seems to be directed at laser and inkjet printers, the dot-matrix printer market is still very much alive.

In fact, dot-matrix printers account for around 60 per cent of all the printers currently sold. Epson, the company that practically invented dot-matrix printing, produces around half of these machines so, understandably, it is keen to preserve its bread and butter business.

The future of dot-matrix printers now seems assured thanks to Epson's latest development, ESC/P2. This is the second version of the ESC/P control code standard (Epson Standard Code for Printers) now known widely as Epson LQ compatibility. The company claims that ESC/P2 brings some features of page printers to the world of dot-matrix printing. This will certainly find favour among eight-bit BBC Master 128 and Model B users who cannot make use of many of the attractive features of a laser printer.

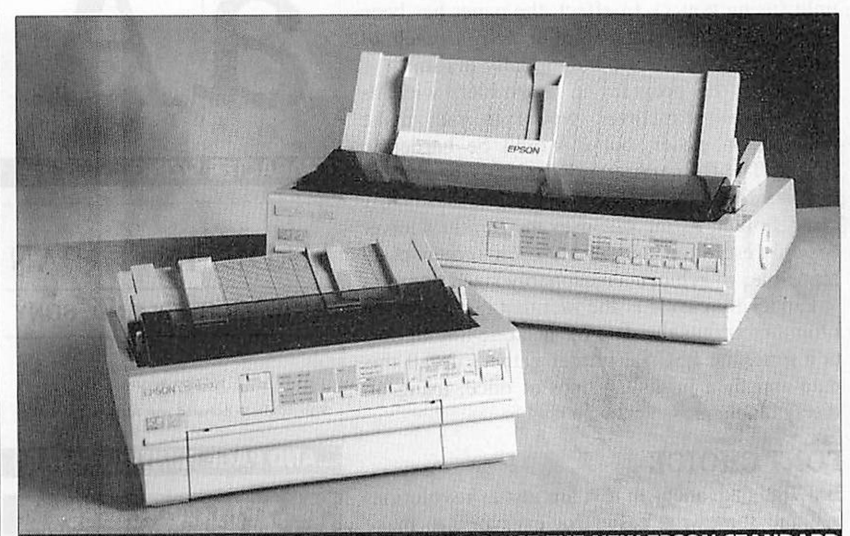
But it isn't just the control codes which have been developed – ESC/P2 goes further than that with several features entirely new to dot-matrix printer design.

NEW STANDARD

The ESC/P2 standard has been introduced across a range of new Epson 24-pin printers and is likely to be adopted by other manufacturers. If they latch on to the new standard as enthusiastically as they did to the original, there will soon be an epidemic of new 24-pin printers with ESC/P2 compatibility.

There are four Epson ESC/P2 models available at present – the LQ-570 and LQ-870 plus the wide carriage versions, the LQ-1070 and LQ-1170. The good news is that the higher standard does not mean higher prices. The new Epson models range from £339 to £729 – fairly typical prices for this quality and speed, which will almost certainly be discounted by dealers. Although the cost of the rival laser printer is falling all the time, the running costs of a laser can make them very expensive to use.

Mechanically, the new printers remain virtually unchanged – they are 24-pin machines which print with two rows of 12 pins hammering from the printhead, through an inked ribbon on to the paper, to create shapes made up of individual dots. A point to note is that ESC/P does not apply to 9-pin printers – even Epson seems to admit that these have had their day. The new control codes are totally compatible with ESC/P printers and when used with software intended for current machines, the ESC/P2 printers will produce equally good results.



THE LQ-570/1070 PRINTERS ARE THE FIRST TO USE THE NEW EPSON STANDARD

The printers offer two printing modes, draft or near letter quality (NLQ). In fact ESC/P2 provides for all the functions catered for by the current codes – font selection, page formatting, user-defined characters and graphics – but offers advances in three main areas: graphics, fonts and general design.

BETTER GRAPHICS

The graphics enhancements are based around one simple mechanical advance. The new machines can print two dots next to each other. At the highest resolution of 360 dots per inch (better than most laser printers) ESC/P printers required two passes of the printhead over each line of the image; ESC/P2 machines can print to this resolution in just one pass.

This not only speeds up graphic dumps but, because each line is produced in one go, the dots are positioned more accurately and the resulting images are marginally more even.

RASTER MODE

Leading from this printhead advance is a new raster graphics mode which makes child's play of the task of writing dump software. Rather than split the screen image into vertical strips of 24 pixels (not a very computer-friendly number) the raster graphics mode operates just like a television raster display. An ESC/P2 dump program simply outputs in turn a one or a zero for each dot in a line across the paper. What's more, the dot spacing is the same vertically and

horizontally, so circles are printed as circles, squares as squares, and so on.

The vertical and horizontal resolutions can be set to either 360 or 180dpi and for different screen memory maps, you can output two or more rows of dots at once. It is also possible to output the data in a compressed form of print data followed by a count.

Listing one (see our Yellow Pages box below for details) demonstrates how the raster graphics mode can be used with graphics programs. The program simply looks at each pixel on a mode 0 screen in turn and sends a set or reset bit to the printer according to whether the pixel is lit or unlit (using POINT). In effect, the paper has been split into print pixels 1/360in across, each of which can be addressed individually in turn.

Writing the program in assembler, with its register shift functions, would in fact make things even easier, but it would be harder to follow. The Basic program we supply has lots of REM statements to make its operation reasonably clear. In fact, listing one uses the printer's lower 180dpi resolution and prints each screen pixel four times to achieve a reasonably sized dump.

Especially clever is the fact that, although the program outputs the data for just one line of dots at a time, the ESC/P2 printer gathers up all this data and then prints 24 lines at once, using all the available pins.

FONT CHOICE

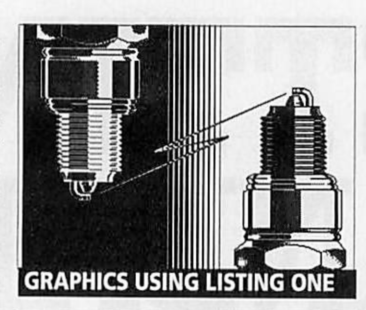
ESC/P2's advances in text are just as revolutionary and somewhat easier for everyone to make use of. The four Epson ESC/P2 printers offer an excellent range of nine NLQ fonts, two of which (Roman and Sans Serif) are fully scaleable and can be printed any size from 8 to 32 points high (about 3mm to 12mm) in 2pt steps.

The different sizes are not formed by distorting the fixed size characters, (the old ESC/P characters are printed in double height, compressed, and so on) but with genuine re-sized character outlines just like Archimedes or Postscript characters, as shown in our second example above. A single, albeit lengthy, command which is easy to insert into a Wordwise file or View printer driver selects the character size and the printer looks after the rest. Larger characters require more than a single line of print but the printer handles this automatically.

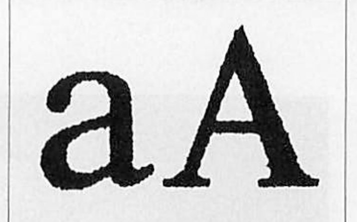
Our third example is rather more trivial – it is a *Wordwise* document that demonstrates the character sizing by producing one page of the Sony chairman Akio Morita's autobiography . It shows just how close to DTP this will allow Beeb owners to get. The entire page was created, without too much effort, using just *Wordwise Plus* and the Epson LQ-870 and it took about 40 seconds to print.

For Acorn users, the other text addition is somewhat minor: ESC/P2 also allows the whole IBM character set to be printed, including Ascii numbers 1-20, 22-31 and 127 (card suits, smiley faces, musical notes, arrows and so on) not produced by old ESC/P machines.

Apart from giving a few extra characters to print, this completes the tie up between Epson and IBM compatibility and this should serve to extend the popularity of the ESC/P2 code.



GRAPHICS USING LISTING ONE



CHARACTER SIZING...

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YELLOW PAGES

All of the listings mentioned in this article can be found in Yellow Pages under the heading Printers, Of course, in time software will be written to take full advantage of the new printer codes but these programs make an excellent starting point. Instructions on how to type in a listing can be found on page 81. The listings can also be found on the subscriber's monthly disc (get yours free by subscribing to BBC Acorn User – see page 29.)

GENERAL DESIGN

Other general improvements include a radical, but carefully thought out, design approach. These machines look weird, having a strange tilted styling that puts the controls to the fore wherever you choose to position your printer.

The font in use and the character pitch can all be selected from the comprehensive front panel, along with the usual paper line and form feed. Likewise the paper handling is as versatile as it is possible to be. Paper can enter these machines from the top, the rear, the front or the base. Needless to say, paper loading is automatic.

With the various optional cut sheet feeders (low and high capacity bins are available for paper or envelopes and even a two-bin arrangement is possible), and the optional and built-in tractor feeds, up to five different paper sources can be fitted at once. One paper type need not be be unloaded to temporarily load another.

Uniquely, the new ESC/P2 printers are all designed to use the same cut sheet feeders. Naturally, different width feeders are required for the narrow and wide carriage printers but the LQ-570 and LQ-870 both use the same accessories. Epson will extend common accessories to new machines, at considerable savings – the 80 column feeders are priced at £49, while the wide carriage feeders cost £79.

Of course, all of this would just be so much gimmickry if the printers themselves were not up to scratch. Fortunately that is far from the case. The more expensive LQ-870 was put through its paces for *BAU* and it performed admirably. This machine is fast, well up to the speed of the fastest rival machines at this price.

There are two draft modes – one gives slightly better print quality than the other but is a touch slower. The difference in quality is small and most users will stick with the fastest mode that can produce text at 174 characters per sec, or about four pages per minute.

What's more, the quality of print is without equal in the world of dot-matrix printing. Draft print is quite legible and the NLQ print, in all nine fonts, would match many laser printers.

The LQ-870 is an extremely capable machine. Quite apart from the additions that ESC/P2 provides, it is a solid, high performance printer with many novel but eminently useful design features. The LQ-570 and LQ-1070 are about 25 per cent slower but otherwise found to be up to the same standard.

CONCLUSION

It is unlikely that ESC/P2 will win over wealthy, potential laser printer buyers to dot-matrix printers, but it is certain that the improvements found in the new standard make these new printers highly desirable items to those who cannot afford to take the laser route.

For BBC micro owners in particular, the improved graphics and the whole new world of scaleable fonts mean that the ESC/P2 printers are a viable alternative to page printers. For that reason alone, the development of the new standard has been well worth the effort and should prove a popular choice.

For more details on ESC/P2, and the new range of printers, call Epson on (0442) 22722.



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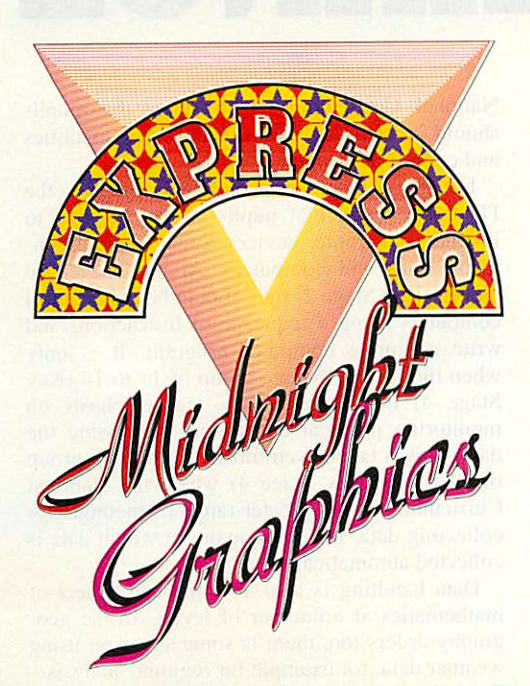
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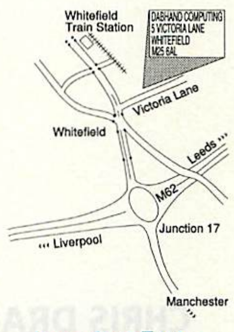
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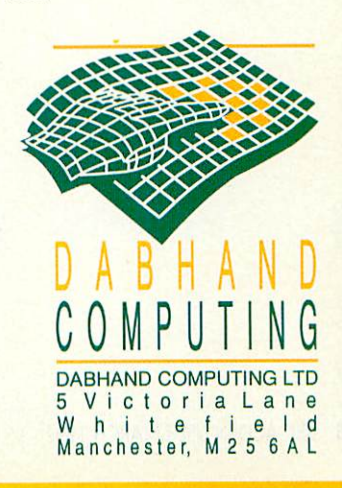


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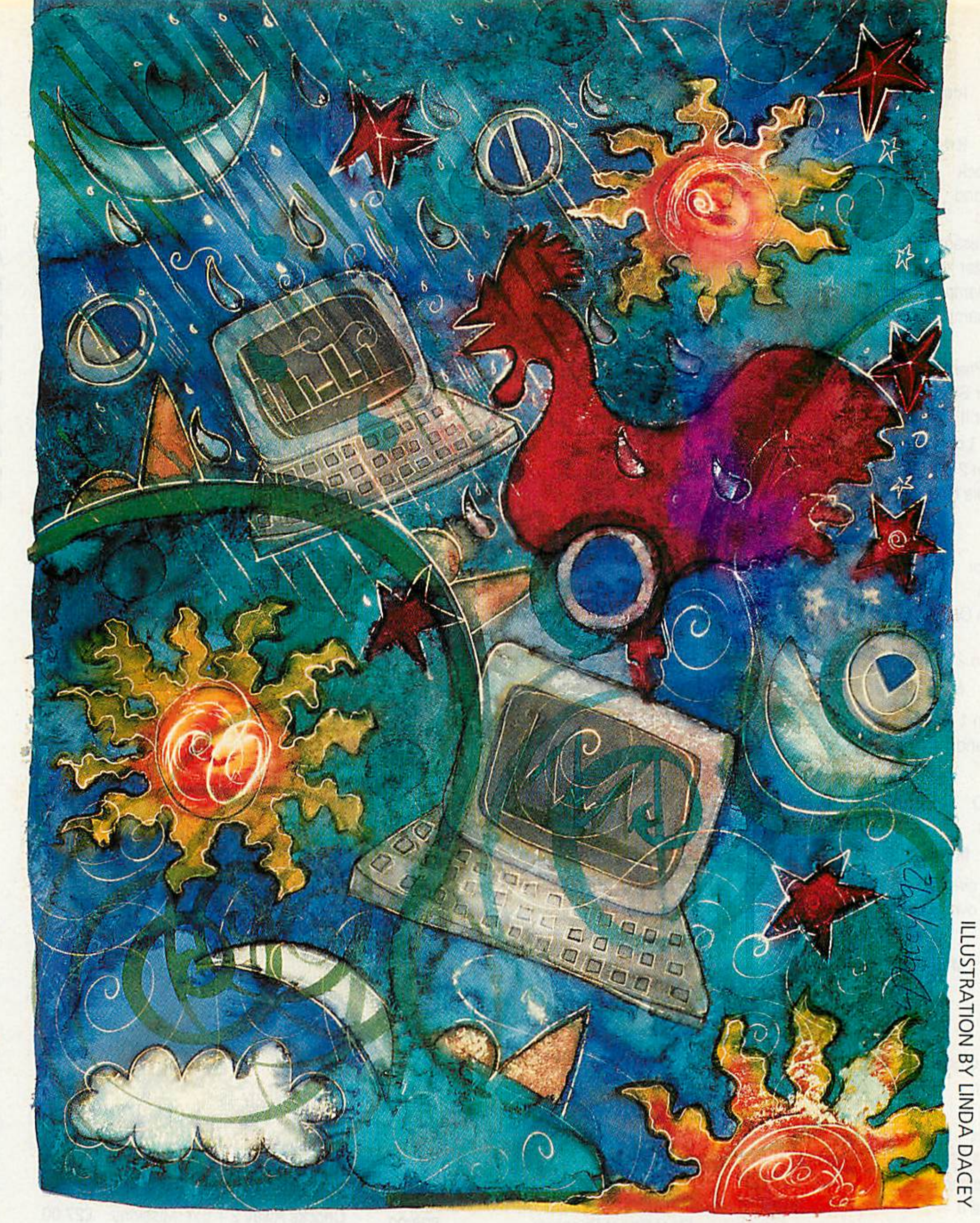


ILLUSTRATION BY LINDA DACEY

CHRIS DRAGE looks at a range of data loggers designed to monitor the environment

WINDS OF CHANGE

Anyone who has ever harboured a secret desire to be a weatherman will probably find that data loggers are a joy to use. Or, on a more serious note, data loggers are great for school projects, and can monitor a range of environmental changes such as temperature, wind speed and many more. Some can even monitor the number of footsteps across a room.

There are many different types of data loggers, available across the range of Acorn machines, but they all do basically the same thing. A data logger takes sensor readings and stores them in memory. There are in fact two types: digital sensors, such as on/off switches, can be used to count events, while analogue sensors, such as thermistors, detect subtle changes in the environment. There are a wide range of sensors available, allowing you to monitor all manner of chemical, physical and biological phenomena.

As far as schools are concerned, data logging can play its part in fulfilling the demands of the National Curriculum which states that pupils should be able to "measure physical quantities and control movement."

For five to seven year olds (Key Stage 1) the IT orders stress that pupils should be able to instruct electronic devices such as programmable toys and computers. At ages seven to eleven (Key Stage 2) they should be able control computers using a sequence of instructions and write a simple computer program. It is only when they reach the age group of 11 to 14 (Key Stage 3) that there is any real emphasis on monitoring physical events and processing the data. This is taken even further for the age group of 14 to 16 (Key Stage 4) where the National Curriculum cites a greater range of methods for collecting data, including many in which data is collected automatically.

Data handling is also an important aspect of mathematics at a number of levels. In the geography orders too, there is some stress on using weather data, for example for regional analysis –

an ideal task for a data logging system. However the most important factor for teachers will probably be that all important question – will it work on my machine? In this case, the answer is yes. If you have a BBC B or Master 128 then you do not need anything other than a data logger and the necessary sensors. A3000 owners must, in addition, have a serial upgrade fitted, costing about £20, and the A310/400 series needs an Acorn I/O podule. As for the range of data logging devices on the market, there are quite a few to choose from.

BASIC SKILLS

For younger children and older children with learning difficulties there is The Measuring Box. This system is made up of a small plastic box which holds three, surface-mounted sensors, a large pressure mat, a disc of software for BBC B/Master 128 computers and a manual. It allows four different items to be recorded: sound level with a small microphone, light level with a light detector, air temperature with a calibrated thermistor and movement with the pressure mat.

The three programs provide current readings, graph plotting over one minute and recording over longer periods and the resulting graph may also be printed out. This system puts the emphasis on interpretation and not on the process of setting up and monitoring events. It encourages young children to use their imagination and to use facts in a precise manner.

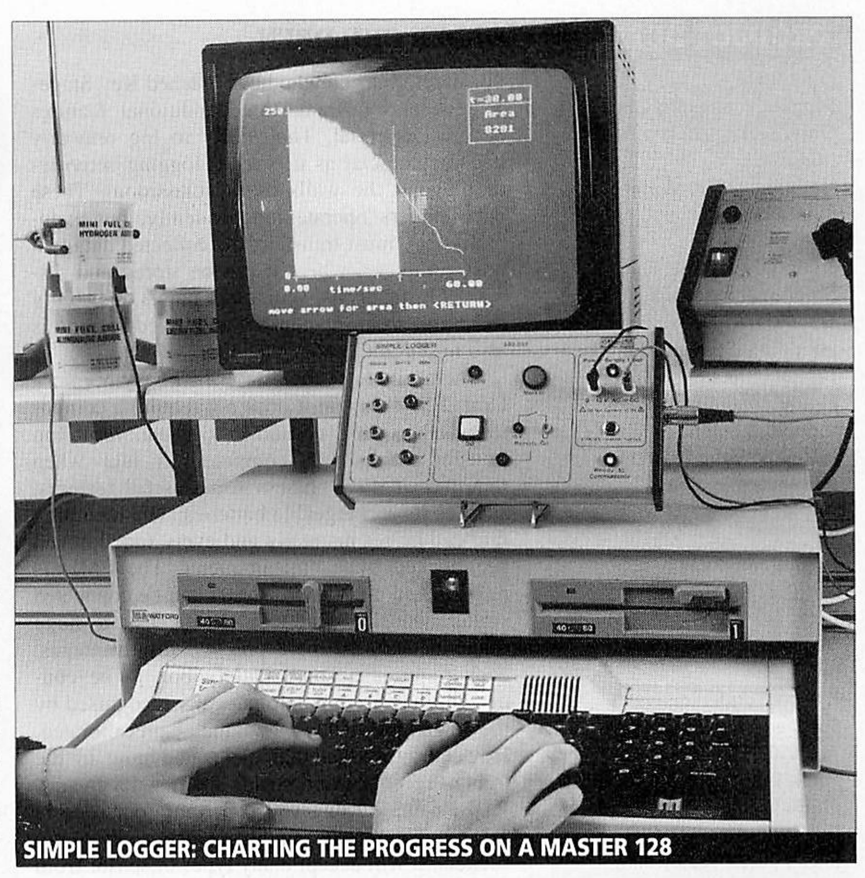
The robust First Sense Starter Kit avoids the need for complicated hardware, wiring or too many instructions and includes an interface, three sensors, connecting leads and suitable software. The system is designed to work with a range of computer systems found in schools requiring only the necessary lead and software and is aimed at the primary teacher who has no special computer skills.

The extensive range of sensors includes: light, temperature, sound, pressure, humidity, rotation and position. With up to four sensors being used simultaneously, rudimentary weather monitoring can be taken from the classroom window. Unusually, eight AA size batteries are required for the sensors which makes this unit more expensive to run. The sensors are very robust and safe but are quite bulky as they are designed to be hand-held. All sensors are self-identifying and splash-proof with the temperature and light sensors being waterproof as well.

The software enables children to see changes in the environment on screen as they happen, with the results being recorded as a bar chart, a line graph or as simply a table of readings. It also has the ability to build up a daily weather file including brightness, temperature, humidity, pressure and wind speed. If you can afford it First Sense is a super system.

MOVING ON

At the next age range, Measure It has been designed with the Key Stage 2 firmly in mind. It includes an interface box, two temperature sensors, a light sensor and a thumb switch on a lead. The hardware is simple, well designed and robust enough for little fingers. Measure It uses the BBC/Master computer during all its activity and is not able to log data remotely.


SIMPLE LOGGER: CHARTING THE PROGRESS ON A MASTER 128

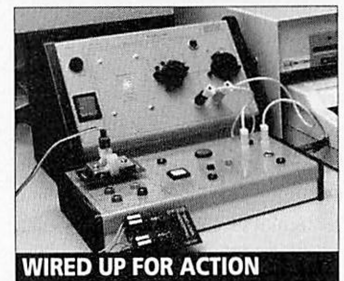
Two other programs are recommended for use with Measure It hardware. The first, *Toolkit* will be familiar to many secondary schools. Another package called *PriSM* is particularly well suited to primary science activity when combined with Measure It. Indeed, the *Intro-PriSM* program introduces the concepts of data logging extremely well and the speaking thermometer is delightful and is useful for partially sighted children.

Sense is a low-cost version of Sense and Control, which is aimed at older children. (We will look at Sense and Control in more detail later.) Sense can be used successfully in multi-subject experiments at all levels. It has six inputs labelled one to four and A and B. Being a serial device, Sense connects equally well with a BBC B/Master 128 or an Archimedes (with an analogue port added).

The range of self-identifying sensors is steadily growing, with all the popular ones available: light, temperature, position, light gates, pressure mat and light switch. Software for use with Sense includes *Practical Science With Microcomputers,* or *Intro-PriSM/PriSM.*

The NCET Sensing Science Pack will appeal to primary teachers looking to introduce IT into their science teaching. The pack comprises the Sense interface, *Intro-PriSM* and *PriSM* software, two light sensors, two temperature sensors, a turn sensor, a general digital sensor and an input connecting block. This all adds up to make this pack the most comprehensive introduction to data logging.

Although they have much in common, Sense differs from Sense and Control in one important way – remote data capture is not possible as Sense can only be used when connected to a computer and so limits older children.


WIRED UP FOR ACTION

PRODUCT DETAILS

Product:The Measuring Box
Supplier: Panthera, 5 Cedar Close, Beeston, Nottingham NG9 2HA
Machines: BBC B, Master 128
Price: £60

Product: First Sense, EMU
Supplier: Philip Harris
Tel: (0934) 413063
Prices: First Sense Starter Kit – £232, interface only £125. EMU –£226 (including connecting lead)
Machines: BBC B/Master Archimedes

Product: Measure It
Supplier: Resource
Tel: (0302) 340331
Price: £85
Machines: BBC B/Master

Product: LogIT
Supplier: Griffin & George
Tel: (0509) 233344
Prices: £185 (starter pack), £29.90 (connecting lead and Link Pack software), £9.90 (mains power supply unit)

Product: Simple Logger
Supplier: Unilab
Tel: (0254) 681222
Prices: £133 (including software), £7.80 (input card for Simple Logger) £56.03 (20v bench power supply unit)
Machines: BBC B/Master, Archimedes

Product: Sense and Sense and Control
Supplier: Educational Electronics
Tel: (0525) 373666
Prices: Sense £39 including software, NCET Sensing Science pack: £175, Sense and Control £179 including pressure mats. (The full data logging package £339).

Product: Sense It
Suppliers: Deltronics
Tel: (0269) 843728
Price: £96
Machines: BBC B/Master

All prices exclude VAT.

OLDER CHILDREN

For older children who have reached Key Stages 3 to 4 and beyond, three additional features become essential. The ability to log remotely becomes crucial as it extends logging activities far beyond the walls of the classroom. These data loggers operate independently, but eventually they must transfer their collected data to a host computer, where it can be stored and displayed for analysis. With older pupils, the ability to be able to have snapshot and timed logging is also important.

One attribute of the established Easy Memory Unit (EMU) is that it does not require a computer at all to set it up and to log data, yet it can transfer data to a computer as and when required. It does possess some useful features, such as its rechargeable batteries. The recording rate can be set manually and every function can be checked by a built-in meter. The EMU is reliable and up to four sensors can be connected simultaneously. Although EMU has a huge range of sensors there are two disadvantages: each requires a small battery box to be connected, they are not automatically recognised by the software, nor are they precalibrated. However, the system looks dated now in the light of recent developments and it is not cheap.

The Simple Logger also permits four sensors to be connected simultaneously via 4mm sockets. It will accept many types of sensor from the Philip Harris type to simple sensors you connect up yourself with a length of wire. This logger is controlled by two push buttons and has four LEDs to indicate what is happening. The Simple Logger must be programmed from the host computer to accept the number of sensors and the rate at which readings are taken.

It can then log data in real time, with the computer software displaying the values as they are recorded. It can also log remotely. The software includes a useful tutorial which makes the technical nature of the software far more easy to follow. The system includes triggered logging (for example to start logging at a certain temperature) and event logging (to begin logging when a certain event has taken place). Full data analysis and display is possible.

Although the price tag is attractive there are a few drawbacks – there are no internal rechargeable batteries so an external power source is needed, manual calibration of sensors is a little archaic and there is no on-board clock to enable timed or preset recording of data.

Sense It Science Kit (Deltronics) comes complete with seven sensors, but is not a remote type and must remain linked to a computer. It can handle up to four, automatically calibrated sensors at once and is extremely sturdy, requiring no batteries in use. The software includes 10 menu-driven programs for collecting, displaying, analysing and storing data and printing out screens. It can also can be configured to a simple version better suited to younger pupils. Comprehensive resources pupils are included in the pack and offer 10 experiments (at Key Stages 3 – 4) to be undertaken immediately. Sense It is affordable, simple to use, keeps the technology at arm's length, and provides many useful starting points for experiments.



TWO VERSIONS FOR DIFFERENT AGE GROUPS

LogIT is extremely light and small, and is a truly remote logger. The starter pack comprises a LogIT, light level and temperature sensors packaged in a plastic briefcase. LogIT can accommodate up to three sensors and possesses a serial port, a control interface and a power socket. The controls comprise two push buttons: green (to start) and red (to stop) each with an accompanying LED. Its major attribute is the ease with which data can be recorded - just press a button. LogIT automatically recognises sensors and gradually decreases the frequency of measurements until the stop button is pressed, 'sleeping' between readings to conserve battery life and serially downloading the data to the host computer. It can also be programmed for timed samples, event and triggered logging and can accept a variety of sensors.

LogIT is very versatile, portable logger which can be set up to be as simple or complex as you want it to be. It is well supported with human physiology software and weather adaptor set (for the Digitar Weather Station) and progpack eproms on which LogIT programs can be stored semi-permanently. Fully Risc OS compliant logging software will be soon be available.

However, LogIT's biggest rival is Sense and Control which we mentioned earlier. It comes in two forms: the basic hardware and software kit or the full data logging pack which includes eight different sensors and comprehensive National Curriculum materials from NCET entitled *Practical Science with Microcomputers.*

Sense and Control can handle four analogue and two digital sensors (all self identifying), has a serial communication port, and BBC-style A to D User and printer ports. With its own batteries and micro processor, it can be a substitute I/O podule on the Archimedes/A3000. Sound and Control communicates serially with the host computer from which it is programmed, before it can log remotely. New Risc OS compliant software provides timed, delayed and sensor activated logging. Its simplicity will be appreciated by non-computer literate teachers, yet the system can be put to quite sophisticated logging tasks. In addition, it can also double as a control interface to environments via the Power Sac controller. Importantly, for schools, the Sense/ Sound and Control offers coherence and continuity across the age ranges.



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GO WITH THE FLOW

MARK SIDEY presents a watertight case for simulating liquids on the Archimedes

Liquid is a program that can create a truly watery landscape – a red or blue liquid is cascading down your screen and you can play around with the concept by creating fountains, dams and all manner of water traps.

The shapes, ranging from slopes to bowls, are drawn using the mouse and can be altered in mid-flow. For instance, you can change the tide by drawing a bowl, filling it with liquid and then making a hole in the bottom to let it all run out.

Having chosen the type of simulation from the menu, set up the screen. Use Select for thick lines and Menu for thin ones. To erase, or make holes in shapes, press Adjust-Select or Adjust-Menu. To draw sorting pixels (see later), press TAB together with Select or Menu. Pressing 1 locks the y axis of the mouse, and 2 the x axis, which helps to draw straight lines. You can also start with a filled screen into which you erase tunnels, by pressing F. However, this won't work when the liquid is flowing.

If you choose two liquids flowing in opposite directions, all mouse drawing is mirrored. This is switched on and off by F2 and F1 respectively. Finally, to start the flow, press ALT. Press ALT again to return to the main menu.

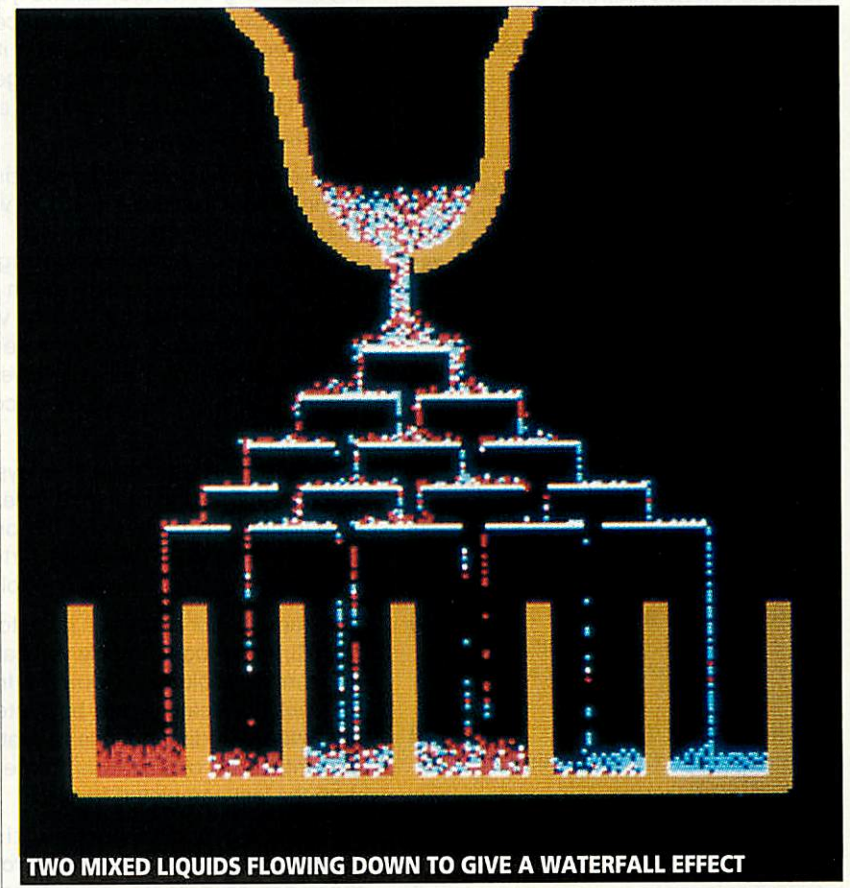
THE PROGRAM

The simulated liquid consists of a number of drops. For a drop to move, the following rules are applied. If the pixel below it is empty (black) it moves down. If not, left and right of the drop are checked. If only one direction is clear it moves that way, but if both ways are clear the drop will move 'randomly' in either direction. Finally, if all three ways are blocked, but there is an empty space above, the drop will move up. This last rule is very important – without it, the liquid can't flow around U-tubes, or in fact over any vertical barrier.

To obtain the fastest possible speed, all checking and plotting of drops is performed by directly accessing the screen memory. Each drop's position (or screen address) is stored in a table. Another table contains status bytes for each drop – there are three flags in each byte.

The first flag is set if the drop has not yet started flowing. (A drop can only start if there is space for it at the top of the screen.) The second flag shows the drop colour (zero or one) and the final flag is set if the drop is upward flowing. The flags are all set, depending on the choice made at the start of the program in set_flags. Note the Not_Started flag must always be set at the start.

The number of drops and the colours can be changed by altering the appropriate variables in the set_variables procedure. With certain numbers of drops you may encounter a kind of beat effect on-screen due to random numbers being obtained using the centisecond clock. If the time taken for the computer to cycle through all of the drops once is almost exactly a multiple of one centisecond, it loses the randomness. Counter the effect by using a few more or less drops.



TWO MIXED LIQUIDS FLOWING DOWN TO GIVE A WATERFALL EFFECT

YELLOW PAGES

To use this program turn to the listings entitled Liquid in the yellow pages and type them in. Instructions on how to copy the listing in and run the program are given on page 81. This program is also supplied free to subscribers on the monthly disc.

THINGS TO TRY

Try drawing with sorting pixels. If a drop lands on one, and it is clear to the left and right, instead of random chance, the colour of the drop determines its subsequent movement – red drops flow left and blue drops flow right. Liquid will spontaneously flow up a tube one pixel wide so you can design syphons and capillary tubes, or even cheat gravity and pipe the liquid from a basin at the bottom of the screen up to the top.

As it is, the simulation is basic. Try adding factors, such as cohesion to form larger drops, or take pressure and velocity into account so that the liquid accelerates as it falls, and splashes when it hits a surface. Or flow with the tide and add a pump or water wheel.

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HARD 'N' EASY

Keeping your hard disc in shape is easier than you think. **PAUL JAMES** shows you how

All us people with hard discs face a similar problem – that of organisation. Admittedly, having the capacity to store thousands of files in one place is great, but don't forget that it has to be kept neat and tidy, just like your desk at work or school.

However, certain aspects of this necessary organisation will require you to understand the set-up of the *!Boot* files, *!Run* files and other gadgets that generally hide some of the complexities of Risc OS. Keep reading and you'll discover, among other things, how to modify your *System* directory, add as many fonts as you like and design your own icons to personalise your desktop.

SYSTEMATIC

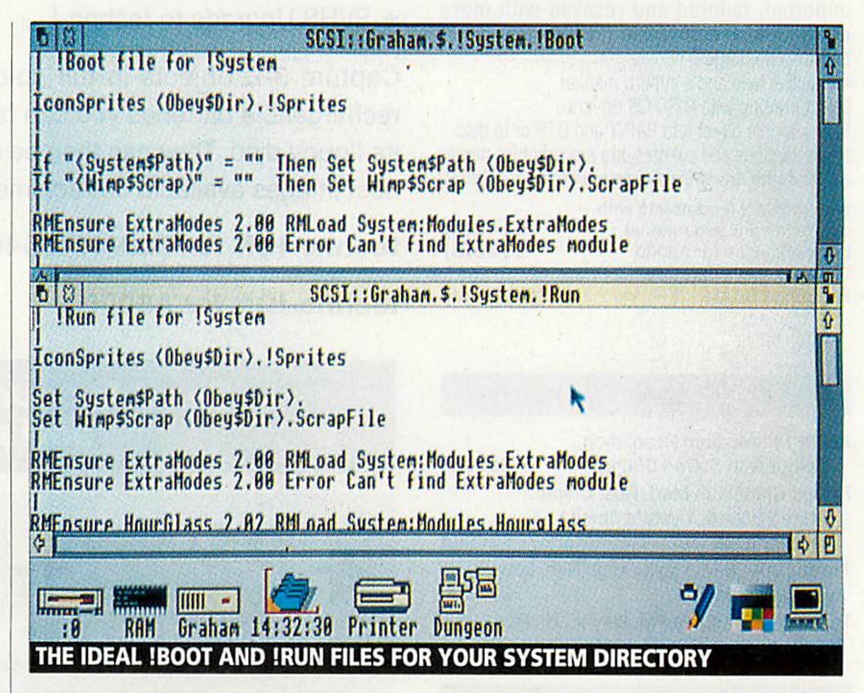
The *System* directory is an important part of Risc OS as it contains the shared resources, modules that can be used by more than one application, in much the same way that your spice rack at home stores frequently used spices. For instance the CLib module has routines that are used by *Draw*, *Paint*, *Edit* and many others. Having shared resources cuts down on application size and helps to standardise many common things about the desktop.

System is a directory, as are all applications such as *Draw* and *Paint*. An application directory however, differs in a couple of ways from a normal directory. Most importantly, its name begins with a pling (!). To open an application directory you will need to hold down SHIFT and double-click on Select.

When Risc OS recognises an application directory the *!Boot* file inside it (if it exists) will be executed. *System* is one of two applications that must go into the root directory of your hard disc, that is, the directory which is first displayed when you click on the hard drive icon. This ensures that the *!Boot* file inside the *System* directory is the first to be executed. In the case of the *System* directory the *!Boot* file sets up a few pointers that other applications can use to locate *System* and its resources.

Take a look at the example *System !Boot* file on this page, noticing the comments in the first few lines for clarity. A vertical bar symbol tells the obey file reader to ignore the rest of the line. It's a good idea to add comments such as these to your files, and you should make extensive use of them in your own script files.

The command IconSprites then ensures that the *!Sprites* file inside the application directory is added to the Wimp sprite pool. This usually includes a sprite with the same name as the directory, which is used in the directory viewer



THE IDEAL !BOOT AND !RUN FILES FOR YOUR SYSTEM DIRECTORY

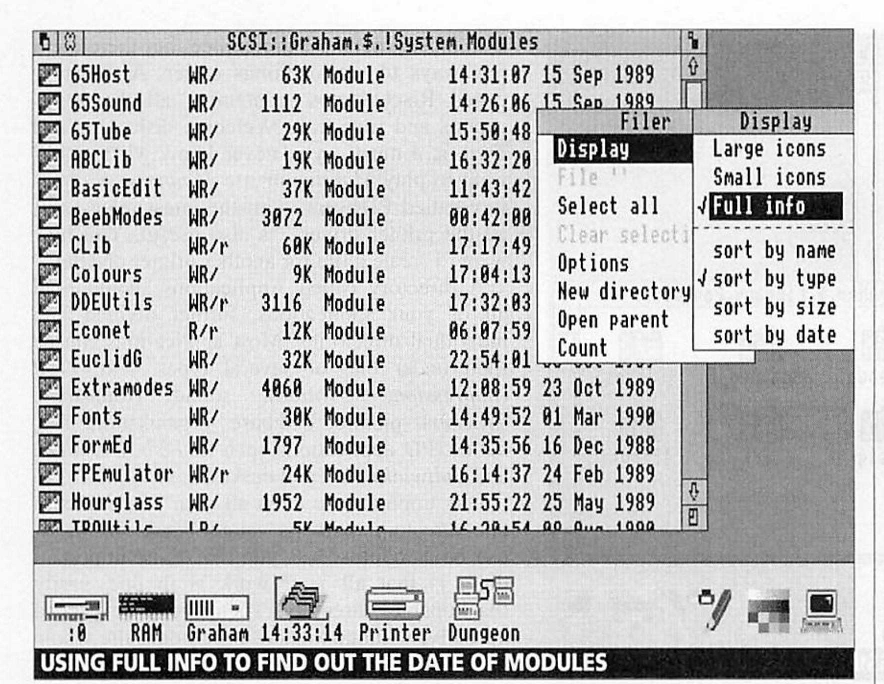
> **NAMES & ADDRESSES**
>
> If you take a look at the title bar of a directory viewer you will notice that there is a textual representation of that directory. Beginning with the filing system (ADFS, SCSI and so on), it is followed by a list of directories separated by dots. This is the internal format of a filename and is not only the file's actual name, but also its exact location – its address if you like.

as an icon. Drag the *System !Sprites* file on to *Paint* to see this – it may give you a hint as to how to personalise your desktop.

Obey$Dir is a system variable which contains the position of the last (or current) obey file to be seen by Risc OS. Setting the System$Path variable to equal the Obey$Dir variable means that there will be a permanent record of where *System* can be found; Obey$Dir changes as you move through the directory viewers. The command If will ensure that it is only set if it was not set before. However, notice that in the *!Run* file of the *System* directory the If statement is omitted. Double-clicking on an application directory executes the *!Run* file, as opposed to Risc OS executing the *!Boot* file automatically. This means that double-clicking on *System* unconditionally sets the current *System* path. You must do this after you've shown your computer any other floppy discs that contain a *System* directory.

When an application needs a module from the modules directory within the *System* directory, such as Clib, the command RMLoad System:Modules.Clib will load it into memory. This is usually done in the application's own *!Boot* or *!Run* file.

This technique is used in my example *!Boot* file to automatically load the module Extramodes. RMEnsure is the same as RMLoad, but will not load the module if it is already in memory. It also has the ability to test the version number of



USING FULL INFO TO FIND OUT THE DATE OF MODULES

a module. On the machines in the *BBC Acorn User* office the *!Boot* file also loads special Econet modules and Arm3 support modules.

ALL CHANGE

Every so often you may purchase an application that will need an updated version of a module. If when installed your application can't find the updated module in your hard disc's *System* directory you will get an error. New modules required by applications will be supplied on a floppy disc, inside a similar *System* directory, and you will have to copy it over to your hard disc's *System* directory.

There are two ways to replace a module. *Sysmerge* is a little application usually supplied with a new module. It will correctly merge two *System* directories by comparing version numbers of the modules that may need updating. If the version number of the module on the new disc is higher than the one in your current *System* directory, then the latter will be replaced.

However, you can just as easily carry out this procedure yourself. Open your *System* directory and then open the Modules directory. Press Menu over the directory viewer, move into the Display submenu and click on Full info. This will tell you the exact time and date when the modules in your *System* directory were created. Compare these with the supplied *System* directory on the new application disc. If a module on the floppy disc has a later date than that of the one in your *System* directory then drag the newer version across. However, before you do this ensure that you rename the old module, to something like OldClib for instance. This is probably being too careful, but an application that runs quite happily using the older version of the module may complain in subtle ways about the new one. Having the old version of the module on your hard disc at least gives you the chance to rectify any faults resulting from the update by temporarily renaming the old module.

If you do decide to use the *Sysmerge* application then ensure that its version number is 1.02. In the case of applications, you can obtain this information from the Info menu on the icon bar. Earlier versions of *Sysmerge* had a small bug that reversed its effect, thereby actively ensuring that your *System* directory was as out of date as possible!

And don't forget to double-click on your hard disc's *System* directory to ensure that the system variable, System$Path, is pointing back to that directory, and not the one on the floppy disc.

Another thing you can do in *System !Boot* files is to automatically run the *!Boot* files of commonly used applications. You must be familiar with the little blank boxes that show that the application that owns the file hasn't yet been seen. More accurately, the *!Boot* file of that application hasn't been executed, so the sprite for that icon isn't yet defined.

For instance, if you frequently use *Draw*, then inserting a line at the end of the *System !Boot* file to execute the *!Boot* file of *Draw* will not only define the draw file sprite, but will also remove the need to see *Draw* before you load a draw file. To do this, simply include the address of the *!Boot* file in your *System !Boot* file, under a little heading that says: Now running the *!Boot* files of popular applications.

EDITING OBEY FILES

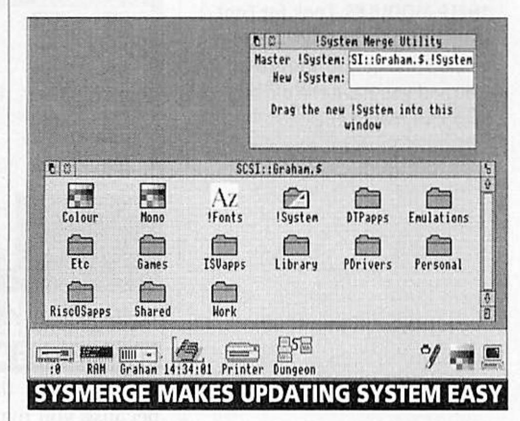
Edit has the ability to edit not only text files, but any file. It can also create Obey file command scripts. Press Menu over the Edit icon on the icon bar and move into the Create submenu. If you click on New Obey file what looks like a normal Edit window will pop up. However, when you save this file, its filetype will be that of an Obey file. Similarly Obey files can be dragged on to Edit for editing.

FONTING AROUND

Your *Fonts* directory is another application directory that should be in the root directory of your hard disc. Many Risc OS applications use fonts and there should always be a system variable set up pointing to this directory.

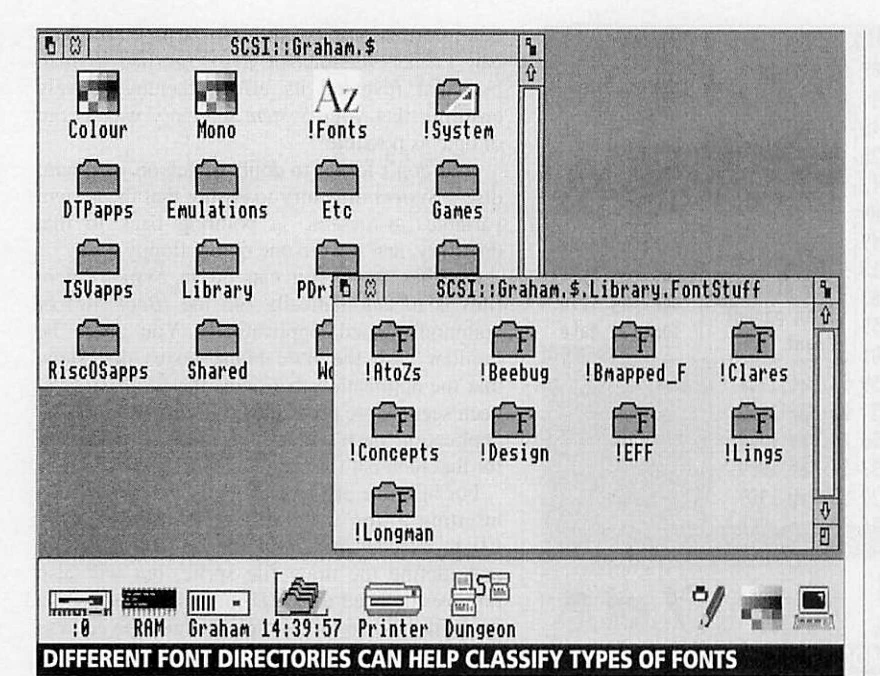
Your root *Fonts* directory should only contain a few fonts – mainly Trinity, Corpus, Homerton and Dingbats (or Selwyn).

It is possible to have several outline font directories, and only add to the list of available fonts when you double-click on one. This method can be used to segregate fonts into fancy and plain typefaces, or into alphabetical groups for example. It will also alleviate the problems that are often caused when you have too many fonts present. For instance, *Edit* crashes if there are more than about twenty, and *Draw* will complain subtly if there are more than about thirty typefaces.



SYSMERGE MAKES UPDATING SYSTEM EASY

It is easy to add another fonts directory to your hard disc. Create a new directory, perhaps calling it *!MoreFonts*, and then copy the contents of the core *Fonts* directory (*!Boot*, *!Run* and *!Sprites*) into it. You will need to load the *!Sprites* file into *Paint* and rename the two icon sprites to !morefonts and sm!morefonts respectively. Then move your selected fonts into this



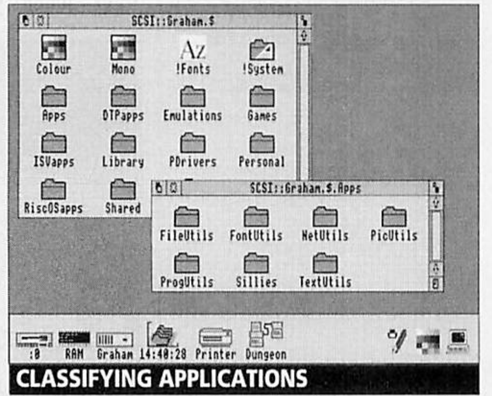
DIFFERENT FONT DIRECTORIES CAN HELP CLASSIFY TYPES OF FONTS

OUTLINE FONTS

If you don't have outline fonts then you should obtain them. But be careful, you may already have an outline font manager. It appears in places such as Impression, Ovation or the Acorn PC Emulator, or you can purchase it with a few fonts direct from your local dealer. Check that your font manager is the outline version by pressing F12 and typing *HELP MODULES. Look for Font Manager; next to it will be a version number. Any less than 2.00 and you have the old bit-map font manager.

new *!MoreFonts* directory. Clicking on the new directory will swap to the set of fonts contained within it.

Do be aware that if you use this system, when you double-click on the new directory your Arc will forget about any previous set of fonts. This is because a system variable called Font$Prefix is set to point to the folder holding the new set. You can modify the line in the *!Run* file within the second font folder so that it reads Set Font$Prefix <Obey$Dir>.,<Font$Prefix>. Then the variable will point at the new fonts, held in <Obey$Dir>, and also at the old set. However,



CLASSIFYING APPLICATIONS

don't change the *!Run* file of the core folder because you may want to return to your core set to run *Edit*.

Now you can create as many font directories as you like. Double-clicking on each will add the extra fonts to the available list, while double-clicking on the core folder will strip the list back down to its minimum again.

WHAT GOES WHERE?

The main problem when storing lots of files and applications on one disc is how to classify them. Putting all of the applications in one big directory is no good. Not only would it be confusing, but it would also take ages to open as Risc OS has to load each *!Sprites* file in each application and obey each *!Boot* file. Therefore applications have to be put into smaller directories.

It is mostly personal preference, but there are a few ways to make things easier. A directory called RiscOSApps, containing all the applications and files from Welcome discs One and Two, is a must – you never know when you'll want to play *Maestro* or use *Madness*. A directory called PDrivers, with the latest releases of all the printer drivers, is also useful. You may want to create a file for another printer one day.

A directory called Applications should hold all of your applications, further divided into individual directories. Most applications can be filed under one of several types: text, DTP (*Impression*, *Ovation*), sound (*Rhapsody*, *Tracker*), picture, database, organisation, file, sillies (PD applications such as *Fish*, *Deskduck* and *Bullwink*), font and desktop.

It is important to keep all your work files in one directory, perhaps called Work (inside, it can be as confused as you like). The important thing is that all your work is in one, easily 'backupable' directory. Then it can be backed up daily, without wasting time doing the whole hard disc. If you have access to a network, your network manager can set aside an area to dump your work directory in, to back up every night.

A library is also important, for dumping things like simple utilities, hard disc formatters, any little programs you write to help you, clip art, or even text files consisting of general notes.

SAVING SPACE

Unless you have a massive hard drive, space will always be a problem; after all you only add files, there's no point in deleting them. The most significant space savings can be made by storing old files in a compressed form. I find that the biggest collection of files on my hard disc is old games that I rarely play. Finished work also falls under this category, and I usually keep an archive file in each directory called *OldStuff*.

Also look out for large sprite files, or files that contain large sprite files, perhaps drawfiles. These can easily eat up to 1Mb a time.

Many applications include a file called *!Help*, describing what it does. To access this, press Menu over the application in the directory viewer, move over App. <appname>, and select Help. However, in some cases it will go on for pages. I recently found a help file of 40K in size and promptly sent it up to help file heaven!

DIY DESKTOP

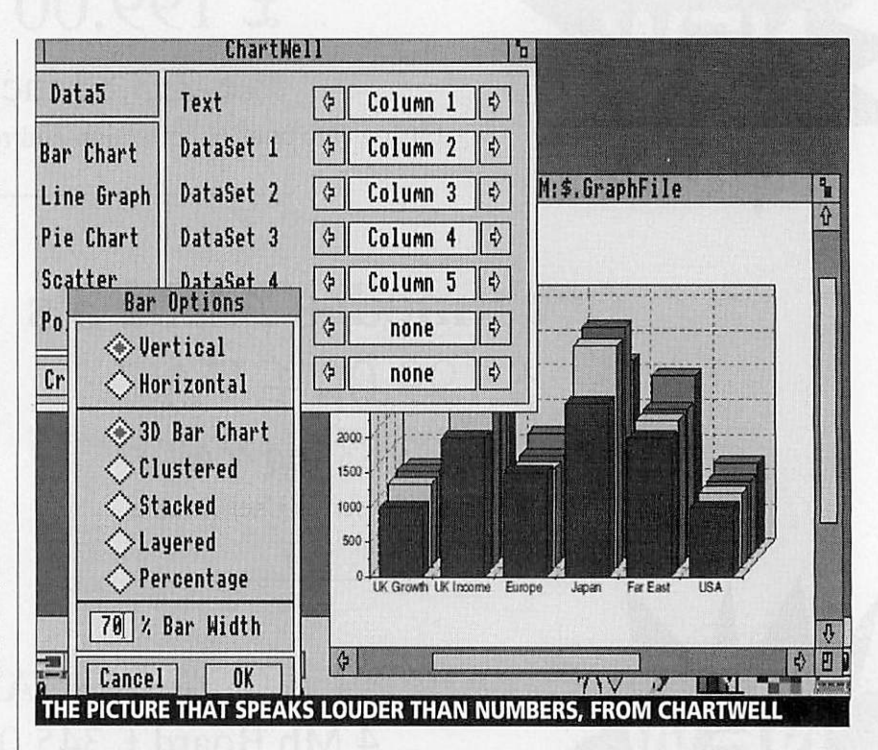
All the icons in the desktop are sprites, for instance the name of the sprite for the floppy disc is floppy disc. You can redesign the icon for the floppy disc by simply creating another sprite with the same name and dimensions and adding it to the !Sprites file in your System directory.

The following is a short program to grab all of the desktop sprites and save them as Wimp sprites. Then you can selectively save individual sprites into your System !Sprites file and redesign them. Don't save all of them into the file as this will waste disc space, and memory.

Press F12, type BASIC, and then type these lines:

```
SYS "Wimp_BaseOfSprites" TO base%
SYS "XOS_SpriteOp",256+12,base%,"WimpSprs"
```

Type *QUIT and the Wimp sprites will now be in a file called WimpSprs.



THE PICTURE THAT SPEAKS LOUDER THAN NUMBERS, FROM CHARTWELL

CHARTED COURSE

GRAHAM BELL looks at two packages designed to bring your office or school data to life

For academics, college or school students presenting experimental results or project data, or for businessmen wanting to show just how much better (or worse) the next year is going to be, there's no denying the attraction and utility of a simple graph. Just as spreadsheets can do the repetitive adding up, graphing and charting applications can be used to turn raw numbers into neat, simple charts.

On the Archimedes, these applications come in two forms; there are the spreadsheets with some graphic capability (Clares' *Schema*, Colton Software's *Pipedream 4* and the forthcoming *Eureka* from Longman Logotron) which allow you to mark out a block of numbers and get an 'instant graph'; and dedicated packages, which take numbers from elsewhere and turn them into graphs – usually the data is imported as a CSV (comma separated value) file, which is a text file containing a list of numbers with commas between. All of these applications offer a range of graph types (bar graphs, pie charts and so on), and you can take a graph and export it as a drawing into DTP package, direct to the printer or into *Draw* for alteration.

CHARTWELL

Risc Development's *Chartwell* is the latest of the dedicated charting applications to make an appearance, following the well-established *Presenter* and *Graphbox* from Lingenuity and Minerva – both have been upgraded recently.

Chartwell is deceptively simple at first, but as with the others, you can set up some complex graph types – for example, polar plots or scattergrams with a superimposed line of best fit. Unlike early versions of *Graphbox*, it installs on the icon bar, and you can drag CSV files onto it from a spreadsheet or disc. A dialogue opens which contains radio buttons to choose what graph type you want – bar graphs, line or pie charts, scattergrams or polar plots.

The menu gives access to a number of options for each graph type – so for a pie chart you can specify whether to explode one sector (the biggest, the smallest or any particular one), and whether to display some text, or the absolute or relative value of each segment as a number in a box just outside the pie. It is remarkably simple.

The options are broken down into a series of relatively small dialogues for each graph type, rather than one giant dialogue controlling all aspects of the graph drawing process. Bar graphs and pies can be flat or 3D-effect – the defaults are for 3D, probably because they make the application more impressive the first time you use it.

The main menu also allows you to change some overall options, such as: the colour to be used for each bar or pie sector; the labels for each of the columns of data (these can also come from the CSV files); the shape and colour of blobs to be used in line graphs; and whether to use a background grid or shading to 'enhance' the graph. You can add a title to the chart too.

All the options chosen can be saved in a 'style sheet' file, which makes it remarkably easy to create the same type of graph again – just drag in the style sheet as well as the CSV file. Once set up, the Create button in the main dialogue produces a standard Save as box with a draw file icon, which you can drag to *Draw*, to disc, to the printer or any other application.

There's no way of editing data once it's in *Chartwell*. If you spot a wayward line on the graph, you need to go back to your spreadsheet or CSV file and edit it. And just as you can't see the raw numbers, *Chartwell* relies on *Draw* to display or print the graph. You can alter fine details in *Draw* as you would expect. None of the elements of the graph are grouped in *Draw*, which can make this a bit fiddly.

Most parts of the package are good and flexible. But for example, although it uses the SwissB font provided for labelling you can change the font in the Run file by altering the Chartwell$Font variable, it seems a bit of an afterthought – it should have been alterable from the main menu. And when you've imported a CSV file, you can in effect change the order of the columns of data or miss one out – very useful indeed.

Also, in common with many other graphing packages, you can't transpose the data. You can't graph by row instead of by column, so you need to make sure your spreadsheet is designed the right way. And there's one quite fundamental flaw: *Chartwell* cannot accept negative values. An update is promised to cure this.

GRAPHBOX PROFESSIONAL

Minerva's *GraphBox Professional* is a large-scale reworking of the original *GraphBox*: it retains facilities like hotlinking to *Pipedream*, adds to the already huge selection of graph types (there are now 43), but also improves upon the presentation of the original and adds some sophisticated new abilities.

You can gauge a feel for the application from the documentation: a chunky slip-case, with a ring binder and an exhaustive manual. But in truth it does a relatively simple job. It takes an array of numbers and turns it into a drawing.

In a change from the original, *GraphBox Professional* installs on the icon bar, and opens a blank graph window only when you click on it. You can drag data files to the icon bar too. Like *Chartwell*, the best way to get data into *GraphBox Professional* is to import a file from a spreadsheet. CSV and TSV (tab separated value) files are accepted, along with SID (software independent data) file format.

These last are in two sections. Half contains the data in CSV form, the other half contains a range of commands that control a lot of the graphing options – in effect, like the *Chartwell* stylesheets. When you have one graph displayed, Ctrl-dragging in another SID file loads the new style commands without the new data. Again, this is good for producing lots of consistent illustrations. (You can produce SID files containing only the style sheet elements by pressing Ctrl while saving.)

Unlike *Chartwell*, *GraphBox Professional* actually shows you the graph – it doesn't just assemble a file for *Draw* to display – and it can print directly too. You can zoom in on the graph in a *Draw*-like way, and make measurements off screen – the precise mouse position can be shown at the top of the window. Of course, the graph can be exported as a drawing: the elements of the graph are neatly grouped which makes editing in *Draw* a bit simpler than with the output from *Chartwell*.

The main *GraphBox Pro.* menu allows you to choose the graph type from a huge list, or set up a host of options to change the look of the graphs. Another choice leads to a way of editing the data or of typing in your own from scratch, like a mini-spreadsheet which can't do calculations. You can insert and delete columns, and copy columns from one part of the table to another by dragging with the mouse. But again there's no way of transposing the table so columns become rows and vice versa.

The Options dialogue window is huge and although it makes extensive use of boxes and borders within the dialogue, it looks confusing and messy. It doesn't change, so there's often a lot of clutter around that simply doesn't apply to the graph type. And, worse, there are hidden menus which only appear if you click in a certain place, so it's difficult to know if you've found them all. Computer Concept's *Impression* DTP package uses hidden menus too but it changes the pointer to indicate their presence. *GraphBox Pro.* does not and in the already confusing dialogue box, the cues get lost.

The options are fairly complete, and allow the same sort of control over background shading, grid lines, axis limits and labels as is offered by *Chartwell*'s more comprehensible dialogues. One particularly thoughtful feature is that the graphs can easily be produced in shades of grey, or even in plain black and white, with a series of hatched patterns that look better on dot-matrix printers than grey shades.

Line fitting is also a bit more flexible in *GraphBox Professional*, with linear, quadratic and cubic line fitting using least squares regression. A range of statistics can be printed out or exported too, giving such values as the number of data points, the means, the standard deviation and sum of squares of x values and the area under a curve, as well as the coefficients of the best fit line. This can be exported as CSV to go back into a spreadsheet, or neatly formatted as plain text to go into a wordprocessor.

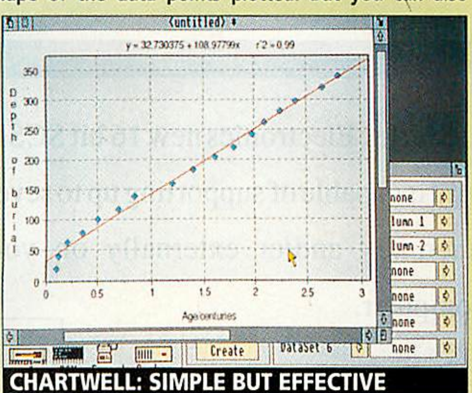
CONCLUSION

At well over £100, *GraphBox Professional* costs considerably more than its competition, and offers an extraordinary range of graph types. These include rainbow-shaded surface plots, vector diagrams and ternary diagrams, so it's worth checking carefully. Yet unless you need one of its more specialist graphs, this package offers very little extra.

Chartwell scores on simpler controls over the basic graph types. It also has enough effects to present material prettily, at a price that makes it attractive to the home or school user.

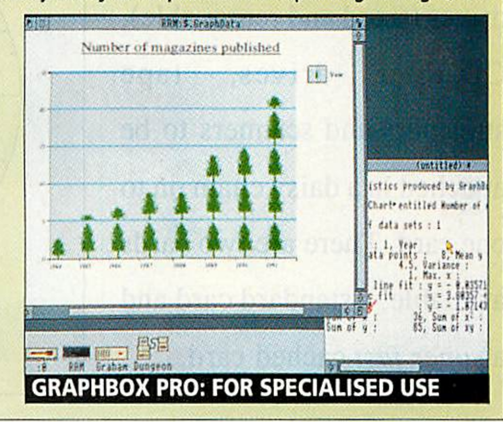
THE ACTION REPLAY

The line graph options are particularly good in Chartwell. As well as plain intervals along the x-axis of a graph, x-y pairs of data points can be used to create scattergrams. You can of course choose the colour and shape of the data points plotted. But you can also superimpose a line of best fit through the points and the graph shows the equation of the line and coefficient of determination (the square of the Pearson product-moment correlation coefficient) too. If you can express the expected errors in your data as a percentage of each value or as absolute values (for example +-8per cent or +-6) then you can also add natty error bars to the graph. These are impressive to look at, although such simple error functions are rare.



CHARTWELL: SIMPLE BUT EFFECTIVE

GraphBox Professional can create 'picture graphs', where the bars are made up of a logo stacked up to the correct height. Company reports are littered with them: a baker's profits shown by stacked ears of wheat; train journey miles presented as speeding carriages, etc. GraphBox's facility is workable but a little rudimentary, with the size of each tile (one ear or one carriage) controlled by the subdivisions of the y-axis. The topmost tile is squashed to fit, rather than being truncated as is the normal treatment. Also the tiling doesn't work properly in multisync or VGA modes. Setting up is simple: choose the type of graph, drag in the data and a draw file containing the pattern. The effect, in the right circumstances can be very impressive.



GRAPHBOX PRO: FOR SPECIALISED USE

PRODUCT DETAILS

Product: Chartwell
Supplier: Risc Developments, 117 Hatfield Road, St Albans, Herts AL1 4JS
Tel: (0727) 40303.
Price: £25.49

Product: GraphBox Professional
Supplier: Minerva Software, Minerva Hse, Baring Crescent, Exeter, Devon EX1
Tel: (0392) 437756
Price: £129

Prices exclude VAT

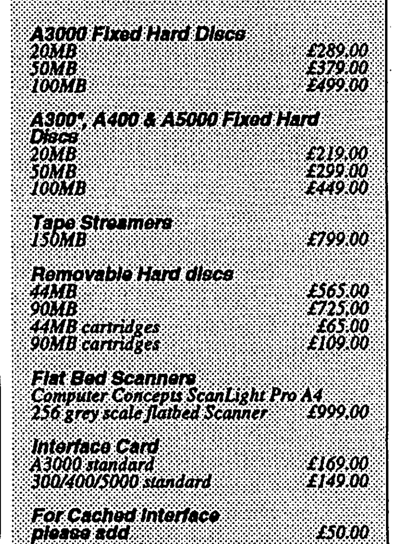
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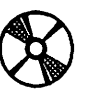
... Our staff are always ready to answer any queries you may have about any of Morley's products especially concerning compatability with your existing equipment.

**Please note that 300 series machines require a MEMC1A upgrade and backplane to be fitted, both available from Morley.*

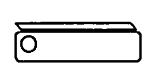

:0

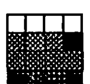

SCSIDRIVE :4

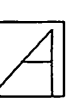

SCSIDRIVE :5


CD-ROM


TAPEDRIVE


SCANNER

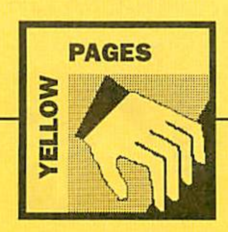






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Program	Page	BBC B B+	B+/ 128	Master 128	Master Compact	Electron	6502SP/ Turbo	ADFS	Econet	Shadow Ram	Archimedes/ A3000/A5000	Monthly disc
★Info	**49**											
Info 1		■	■	■	■	■	■	■	■	■	■	■
Info 2								■	■		■	■
Info 3								■	■		■	■
Info 4		■	■	■	■	■	■	■	■	■	■	■
Info 5								■	■		■	■
Info 6		■	■	■	■	■	■	■	■	■		■
Info 7								■	■		■	■
Info 8								■	■		■	■
Info 9		■	■	■	■	■	■	■	■	■		■
Info 10		■	■	■	■	■	■	■	■	■	■	■
Info 11								■	■		■	■
Info12								■	■		■	■
Arc Assembly	**58**											
Armprog1 - 2								■	■		■	■
Printers	**61**											
ESC1 - 2		■	■	■	■	■	■	■	■	■		■
Liquid	**71**							■	■		■	■

Typing in listings from the yellow pages.

The yellow pages are subdivided into article headings. Each article heading corresponds with its article in the magazine.

So for instance to find listing five of ★INFO in the yellow pages (Fire32) look for the ★INFO heading, then follow the listings through until you get to listing five.

At the beginning of the program are a few lines that tell you what machines it works on. This information can also be derived from the table above.

For Archimedes owners it may not be immediately obvious how to actually type in the listings. By pressing Function key 12 you can access the command line. From here type BASIC and the Archimedes will enter the Basic language. You may like to type MODE 12, which will turn the screen to white on black.

Then simply copy each line of the program in turn after the '>' prompt, pressing RETURN when finished. Save the program onto disc by typing SAVE"<filename>". It can then be run by typing RUN. You will probably need to debug it as you may have made some typing errors.

When you have finished debugging save the program one last time. Then it can either be double-clicked upon from the desktop, or loaded using LOAD"<filename>".

A more detailed description of how to type in listings from the yellow pages appears in BBC Acorn User August 91.

★Info

Listing 1

```
   10 REM >GridPrint (Info1)
   20 REM By Paul Pibworth
   30 REM For all machines
   40 REM (C) BAU March 1992
   50 :
   60 MODE 4
   70 ON ERROR VDU 1,27,1,64,1,10,3:REPO
RT:PRINT" at line ";ERL:END
   80 PROCinit
   90 PROCinput
  100 PROCprint
  110 END
  120 :
  130 DEF PROCinput
  140 PRINTTAB(12);"Table-Grid maker"
  150 PRINTTAB(12);"================"
  160 PRINT'"(C)ontinuous or (S)paced? "
;
  170 REPEAT
  180 sp$=CHR$(GET AND 95)
  190 UNTILINSTR("SC",sp$)>0
  200 PRINTsp$'
  210 IF sp$="C" spaces%=0 ELSE INPUT"Ho
w many spaces "spaces%'
  220 FOR n%=0 TO spaces%
  230 IF spaces%>0 PRINT;"Line ";n%+1;
  240 INPUTTAB(10);"start "st
  250 INPUTTAB(24,VPOS-1);"end "end
  260 st%=INT(60*st)
  270 end%=INT(60*end)
  280 FOR pos%=st% TO end%
  290 tbuf%?pos%=1
  300 NEXT
  310 NEXT
  320 INPUT'"How many vertical lines? "v
lines%
  330 FOR n%=1 TO vlines%
  340 PRINT"Line ";n%;
  350 INPUTTAB(10);"pos. "pos
  360 pos%=INT(60*pos)
  370 vbuf%?pos%=255
  380 NEXT
  390 vbuf%?479=vbuf%?480
  400 INPUT'"How many horizontal lines?
"hlines%
  410 FOR n%=1 TO hlines%
  420 PRINT"Line ";n%;
  430 INPUTTAB(10);"pos. "pos
  440 pos%=INT(72*pos)
  450 PROChoriz(pos%)
  460 NEXT
  470 FOR n%=1 TO 90
  480 IF n%?hbuf%>0 last%=n%
  490 NEXT
  500 ENDPROC
  510 :
  520 DEF PROCprint
  530 VDU 2,1,27,1,64
  540 VDU 1,27,1,65,1,8
  550 PRINT gim$;
  560 FOR n%=0 TO W%-1
  570 ch%=n%?tbuf%
  580 PRINT;CHR$(1);CHR$(ch%);
  590 NEXT
  600 PRINT
  610 FOR line%=1 TO last%
  620 data%=line%?hbuf%
  630 PRINT gim$;
  640 FOR n%=0 TO W%-1
  650 vl%=n%?vbuf%
  660 tp%=n%?tbuf%
  670 IF line%=last% vl%=FNlast
  680 PRINT;CHR$(1);FNbyte;
  690 NEXT
  700 VDU 1,13,1,10
  710 NEXT
  720 PRINT
  730 VDU 1,27,1,64,1,10,3
  740 ENDPROC
  750 :
  760 DEF FNlast
  770 IF vl%=0 THEN =0
  780 loop%=-1
  790 REPEAT
  800 loop%=loop%+1
  810 UNTIL (data% AND 2^loop%)=2^loop%
  820 =256-(2^loop%)
  830 :
  840 DEF FNbyte
  850 IF tp%=0 AND vl%=0 AND data%=0 THE
N =CHR$(0)
  860 IF tp%=1 AND vl%=0 AND data%=0 THE
N =CHR$(0)
  870 IF tp%=0 AND vl%>0 AND data%=0 THE
N =CHR$(vl%)
  880 IF tp%=0 AND vl%=0 AND data%>0 THE
N =CHR$(0)
  890 IF tp%=1 AND vl%>0 AND data%=0 THE
N =CHR$(vl%)
  900 IF tp%=1 AND vl%=0 AND data%>0 THE
N =CHR$(data%)
  910 IF tp%=0 AND vl%>0 AND data%>0 THE
N =CHR$(vl%)
  920 IF tp%=1 AND vl%>0 AND data%>0 THE
N =CHR$(vl%)
  930 :
  940 DEF PROChoriz(a%)
  950 row%=a% DIV 8
  960 mod%=a% MOD 8
  970 IF mod%>0 row%=row%+1:hbuf%?row%=h
buf%?row% OR 2^(8-mod%)
  980 IF mod%=0 hbuf%?row%=hbuf%?row% OR
 1
  990 ENDPROC
 1000 :
 1010 DEF PROCinit
 1020 W%=480
 1030 gim$=CHR$1+CHR$27+CHR$1+CHR$75+CHR
$1+CHR$(W% MOD 256)+CHR$1+CHR$(W% DIV 25
6)
 1040 DIM tbuf% 480,vbuf% 480,hbuf% 90
 1050 FOR n%=0 TO 480
 1060 tbuf%?n%=0
 1070 vbuf%?n%=0
 1080 NEXT
 1090 FOR n%=0 TO 90
 1100 hbuf%?n%=0
 1110 NEXT
 1120 ENDPROC
```

Listing 2

```
   10 REM >Numbers (Info2)
   20 REM Countdown Numbers Game Solver
   30 REM by Michael Rozdoba
   40 REM for 32-bit machines
   50 REM (c) BAU March 1992
   60 :
   70 MODE 0
   80 PROCinit
   90 ON ERROR IF ERR<>17 OR INKEY-1 REP
ORT:PRINT" at line ";ERR:END
  100 REPEAT
  110 CLS
  120 PRINT"Enter Numbers:"
  130 FOR q%=0 TO 5
  140 p%!(12*q%)=q%
  150 p%!(12*q%+4)=q%-1
  160 p%!(12*q%+8)=3
  170 NEXT
  180 FOR q%=0 TO 20 STEP 4
  190 INPUTTAB(15+q%,0)n%!q%
  200 NEXT
  210 INPUT"Target : "!ans%'
  220 TIME=0
  230 CALL solve
  240 PRINT'"Time: ";TIME/100''
  250 PRINT"any key to repeat"
  260 k%=GET
  270 UNTIL FALSE
  280 :
  290 DEF PROCinit
  300 DIM code% 1300
  310 FOR pass%=0 TO 2 STEP 2
  320 P%=code%
  330 [OPT pass%
  340 .ans%   EQUD    0
  350 .buf    EQUS    STRING$(12,CHR$0)
  360 .char   EQUS    "+*-/"
  370 .solve  STMFD   r13!,{r14}
  380 ADR     r0,n%
  390 ADR     r11,p%
  400 MOV     r3,#5
  410 MOV     r12,#(1<<30)
  420 :
  430 .l1     ADD     r14,r11,r3,LSL #3
  440 ADD     r14,r14,r3,LSL #2
  450 LDMIA   r14,{r1,r2,r4}
  460 :
  470 .l2     LDR     r5,[r0,r2,LSL #2]
  480 LDR     r6,[r0,r1,LSL #2]
  490 :
  500 .l3     CMP     r5,r6
  510 BLE     l7
  520 CMP     r4,#2
  530 BLT     l6
  540 :
  550 .l7     CMP     r4,#0
  560 ADDEQ   r7,r5,r6
  570 BEQ     l8
  580 CMP     r4,#1
  590 MULEQ   r7,r5,r6
  600 BEQ     l8
  610 CMP     r4,#2
  620 SUBEQ   r7,r5,r6
  630 BEQ     l8
  640 CMP     r6,#1
  650 BLE     l6
  660 STMFD   r13!,{r4-r6}
  670 MOV     r14,#0
  680 MOV     r4,#31
  690 :
  700 .l9     ADDS    r5,r5,r5
  710 ADC     r14,r14,r14
  720 CMP     r14,r6
  730 SUBGE   r14,r14,r6
  740 ORRGE   r5,r5,#1
  750 SUBS    r4,r4,#1
  760 BPL     l9
  770 CMP     r14,#0
  780 LDMNEFD r13!,{r4-r6}
  790 BNE     l6
  800 MOV     r7,r5
```

```
 810 LDMFD   r13!,{r4-r6}
 820 :
 830 .l8     CMP     r7,#0
 840 BLE     l6
 850 CMP     r7,r5
 860 CMPNE   r7,r6
 870 BEQ     l6
 880 ADD     r8,r0,#24
 890 STR     r7,[r8],#4
 900 MOV     r9,r3
 910 :
 920 .l4     CMP     r9,r1
 930 CMPNE   r9,r2
 940 BEQ     l5
 950 LDR     r10,[r0,r9,LSL #2]
 960 STR     r10,[r8],#4
 970 :
 980 .l5     SUBS    r9,r9,#1
 990 BPL     l4
1000 LDR     r14,ans%
1010 SUBS    r9,r14,r7
1020 RSBMI   r9,r9,#0
1030 SUBS    r10,r14,r12
1040 RSBMI   r10,r10,#0
1050 CMP     r9,r10
1060 BGE     l11
1070 MOV     r12,r7
1080 STMFD   r13!,{r0-r11}
1090 CMP     r9,#11
1100 BGE     l12
1110 ADR     r9,n%
1120 ADR     r10,p%
1130 ADD     r10,r10,#60
1140 RSB     r11,r3,#5
1150 :
1160 .l13    LDMIA   r10,{r3-r5}
1170 SUB     r10,r10,#12
1180 LDR     r6,[r9,r4,LSL #2]
1190 LDR     r7,[r9,r3,LSL #2]
1200 ADD     r9,r9,#24
1210 LDR     r8,[r9]
1220 MOV     r0,r6
1230 ADR     r1,buf
1240 MOV     r2,#12
1250 SWI     "OS_ConvertInteger4"
1260 SWI     "OS_Write0"
1270 ADR     r1,char
1280 LDRB    r0,[r1,r5]
1290 SWI     "OS_WriteC"
1300 MOV     r0,r7
1310 ADR     r1,buf
1320 MOV     r2,#12
1330 SWI     "OS_ConvertInteger4"
1340 SWI     "OS_Write0"
1350 SWI     256+ASC"="
1360 MOV     r0,r8
1370 ADR     r1,buf
1380 MOV     r2,#12
1390 SWI     "OS_ConvertInteger4"
1400 SWI     "OS_Write0"
1410 SUBS    r11,r11,#1
1420 SWIPL   256+ASC","
1430 SWIPL   256+32
1440 BPL     l13
1450 SWI     "OS_NewLine"
1460 :
1470 .l12    ADR     r0,n%
1480 ADR     r1,b%
1490 MOV     r2,#3
1500 :
1510 .l10    LDMIA   r0!,{r3-r11}
1520 STMIA   r1!,{r3-r11}
1530 SUBS    r2,r2,#1
1540 BPL     l10
1550 LDMFD   r13!,{r0-r11}
1560 CMP     r7,r14
1570 MOVEQ   r0,r7
1580 LDMEQFD r13!,{PC}
1590 :
1600 .l11    ADD     r0,r0,#24
1610 SUBS    r3,r3,#1
1620 BGT     l1
1630 SUB     r0,r0,#24
1640 ADD     r3,r3,#1
1650 :
1660 .l6     SUBS    r4,r4,#1
1670 ADD     r14,r11,r3,LSL  #3
1680 ADD     r14,r14,r3,LSL  #2
1690 STRPL   r4,[r14,#8]
1700 BPL     l1
1710 MOV     r4,#3
1720 SUB     r2,r2,#1
1730 CMP     r2,r1
1740 SUBEQ   r2,r2,#1
1750 CMP     r2,#0
1760 ADDPL   r14,r14,#4
1770 STMPLIA r14,{r2,r4}
1780 BPL     l1
1790 MOV     r2,r3
1800 SUBS    r1,r1,#1
1810 STMPLIA r14,{r1,r2,r4}
1820 BPL     l1
1830 MOV     r1,r3
1840 SUB     r2,r3,#1
1850 STMIA   r14!,{r1,r2,r4}
1860 SUB     r0,r0,#24
1870 ADD     r3,r3,#1
1880 SWI     "OS_ReadEscapeState"
1890 CMPCC   r3,#6
1900 MVNHS   r0,#0
1910 LDMHSFD r13!,{PC}
1920 LDMIA   r14,{r1,r2,r4}
1930 B       l6
1940 ]
1950 n%=P%:P%+=6*4*6
1960 b%=P%:P%+=6*4*6
1970 p%=P%:P%+=12*6
1980 NEXT
1990 ENDPROC
```

Listing 3

```
   10 REM >MicroArt32 (Info3)
   20 REM By Duncan Lilly
   30 REM Based on PC version by Mike Wi
lliams
   40 REM For 32 bit machies only
   50 REM (C) BAU March 1992
   60 :
   70 MODE 13
   80 OFF
   90 *FX 4,1
  100 PROCass
  110 plot=increment
  120 PROCsetup
  130 PROCrand
  140 oxcent=0
  150 oycent=0
  160 oscale=0
  170 oang  =0
  180 oplot =0
  190 opal  =0
  200 new   =TRUE
  210 :
  220 REPEAT
  230 IF new OR xcent<>oxcent OR ycent<>
oycent OR scale<>oscale OR ang<>oang OR
plot<>oplot OR pal<>opal THEN
  240 CLS
  250 x=0
  260 y=0
  270 oxcent=xcent
  280 oycent=ycent
  290 oscale=scale
  300 oang=ang
  310 oplot=plot
  320 opal=pal
  330 PROCpalette(pal)
  340 new=FALSE
  350 ENDIF
  360 sin=scale*SINRAD(ang)
  370 cos=scale*COSRAD(ang)
  380 REPEAT
  390 xp=y-SGNx*d*ABS(b*x-c)
  400 y=a-x
  410 x=xp
  420 A%=xcent+x*sin+y*cos
  430 B%=ycent+x*cos-y*sin
  440 CALL plot
  450 g$=INKEY$(0)
  460 UNTIL g$<>""
  470 IF g$>="0" AND g$<STR$palettes pal
=VALg$
  480 CASE g$ OF
  490 WHEN ",","<" : ang=(ang+360+5)MOD3
60
  500 WHEN ".",">" : ang=(ang+360-5)MOD3
60
  510 WHEN "+","=" : scale+=0.05
  520 WHEN "-","_" : IF scale>0.05 scale
-=0.05
  530 WHEN CHR$136 : xcent-=8
  540 WHEN CHR$137 : xcent+=8
  550 WHEN CHR$138 : ycent+=8
  560 WHEN CHR$139 : ycent-=8
  570 WHEN " "     : PROCrand
  580 WHEN "i","I" : IF plot=cycle plot=
increment
  590 WHEN "c","C" :
  600 IF plot=increment THEN
  610 plot=cycle
  620 !count=!timer
  630 !colour=?Coltab
  640 ENDIF
  650 ENDCASE
  660 UNTIL 0
  670 END
  680 :
  690 DEF PROCrand
  700 xcent=160:ycent=128
  710 a=   (RND(1)*2000)-1000
  720 b=   (RND(1)*4)-2
  730 c=   (RND(1)*2000)-1000
  740 d=1/((RND(1)*24)-12)
  750 !timer=RND(600)+200
  760 scale=1
  770 new=TRUE
  780 ENDPROC
  790 :
  800 DEF PROCass
  810 DIM code 800
  820 FOR pass=0 TO 2 STEP 2:P%=code
  830 [OPT pass
  840 .cycle  LDR     R10,Screen
  850 CMP     R0,#320
  860 MOVCS   PC,R14
  870 CMP     R1,#256
  880 MOVCS   PC,R14
  890 ADD     R10,R10,R1,ASL #6
  900 ADD     R10,R10,R1,ASL #8
  910 LDRB    R1,colour
  920 STRB    R1,[R10,R0]
  930 LDR     R0,count
  940 SUBS    R0,R0,#1
  950 STR     R0,count
  960 MOVPL   PC,R14
  970 LDR     R0,timer
  980 STR     R0,count
  990 ADR     R10,Coltab
 1000 LDRB    R0,[R10,R1]
 1010 CMP     R0,R1
 1020 LDREQB  R0,Coltab
 1030 STRB    R0,colour
 1040 MOV     PC,R14
 1050 :
 1060 .colour EQUD    0
 1070 .count  EQUD    0
 1080 .timer  EQUD    0
 1090 .increment
 1100 LDR     R10,Screen
 1110 CMP     R0,#320
 1120 MOVCS   PC,R14
 1130 CMP     R1,#256
 1140 MOVCS   PC,R14
 1150 ADD     R10,R10,R1,ASL #6
 1160 ADD     R10,R10,R1,ASL #8
 1170 ADR     R11,Coltab
 1180 LDRB    R0,[R10,R0]!
 1190 LDRB    R0,[R11,R0]
 1200 STRB    R0,[R10]
 1210 MOV     PC,R14
 1220 :
 1230 .Screen EQUD    148
 1240 EQUD    -1
 1250 :
 1260 .Coltab EQUS    STRING$(128,CHR$0)
 1270 EQUS    STRING$(128,CHR$0)
 1280 ]NEXT
 1290 SYS "OS_ReadVduVariables",Screen,S
creen
 1300 ENDPROC
 1310 :
 1320 DEF PROCsetup
 1330 READ palettes
 1340 DIM pal(palettes-1,255)
 1350 FOR p=0 TO palettes-1
 1360 b=0
 1370 REPEAT
 1380 a=b
 1390 READ b
 1400 pal(p,a)=b
 1410 UNTIL a=b
 1420 NEXT
 1430 pal=0
 1440 ang=0
 1450 x=0
 1460 y=0
 1470 ENDPROC
 1480 :
 1490 DEF PROCpalette(p)
 1500 FOR i=0 TO 255
 1510 Coltab?i=pal(p,i)
 1520 NEXT
 1530 !colour=?Coltab
 1540 ENDPROC
 1550 :
 1560 DATA 4
 1570 REM black/white
 1580 DATA 255
 1590 DATA 255
 1600 :
 1610 REM Greys
 1620 DATA 1,2,3,44,45,46,47,208,209,210
,211,252,253,254,255
 1630 DATA 255
 1640 :
 1650 REM Cool/Hot
 1660 DATA &88,&89,&8A,&8B,&A8,&A9,&AA,&
AB
 1670 DATA &C8,&C9,&CA,&CB,&E8,&E9,&EA,&
EB
 1680 DATA &EF,&FB,&FF,&F7,&7F,&77,&76,&
75
 1690 DATA &74,&57,&56,&55,&54,&37,&36,&
35
 1700 DATA &34,&17,&16,&15,&14
 1710 DATA &14
 1720 :
 1730 REM Rainbow
 1740 DATA &14,&15,&16,&17,&34,&35,&36,&
37
 1750 DATA &54,&55,&56,&57,&74,&75,&76,&
77
 1760 DATA &73,&67,&63,&6B,&E3,&EB,&EA,&
E9
 1770 DATA &E8,&CB,&CA,&C9,&C8,&AB,&AA,&
A9
 1780 DATA &A8,&8B,&8A,&89,&88,&8C,&98,&
9C
 1790 DATA &9C
```

Listing 4

```
   10 REM >MicroArt8
   20 REM By Duncan Lilly
   30 REM Based on PC version by Mike Wi
lliams
   40 REM For all machimes
   50 REM (C) BAU March 1992
   60 :
   70 MODE 2
   80 *FX 4,1
   90 PROCsetup
  100 PROCrand
  110 plot=inc
  120 :
  130 REPEAT
  140 IF new=TRUE OR xcent<>oxcent OR yc
ent<>oycent OR scale<>oscale OR ang<>oan
g OR plot<>oplot THEN PROCa
  150 sin=scale*SINRAD(ang)
  160 cos=scale*COSRAD(ang)
  170 :
  180 REPEAT
  190 xp=y-SGNx*d*ABS(b*x-c)
  200 y=a-x
  210 x=xp
  220 A%=xcent+x*sin+y*cos
  230 B%=ycent+x*cos-y*sin
  240 IF plot=inc P%=POINT(A%*4,B%*4)+1
ELSE P%=colour+1:count=count+1:IF count=
timer count=0:colour=(colour+1)MOD7
  250 IF P%=8 P%=7
  260 GCOL 0,P%
  270 PLOT 69,A%*4,B%*4
  280 g$=INKEY$(0)
  290 UNTIL g$<>""
  300 :
  310 IF g$="," THEN ang=(ang+360+5)MOD3
60
  320 IF g$="." THEN ang=(ang+360-5)MOD3
60
  330 IF g$=";" THEN scale=scale+0.05
  340 IF g$="-" THEN IF scale>0.05 scale
=scale-0.05
  350 IF ASC(g$)=136 THEN xcent=xcent-8
  360 IF ASC(g$)=137 THEN xcent=xcent+8
  370 IF ASC(g$)=138 THEN ycent=ycent-8
  380 IF ASC(g$)=139 THEN ycent=ycent+8
  390 IF g$=" " THEN PROCrand
  400 IF g$="I" THEN IF plot=cycle plot=
inc:count=0:col=0
  410 IF g$="C" THEN IF plot=inc plot=cy
cle
  420 UNTIL 0
  430 END
  440 :
  450 DEF PROCrand
  460 xcent=160:ycent=128
  470 a=   (RND(1)*2000)-1000
  480 b=   (RND(1)*4)-2
  490 c=   (RND(1)*2000)-1000
  500 d=1/((RND(1)*24)-12)
  510 timer=RND(2000)+500
  520 scale=1
  530 new=TRUE
  540 ENDPROC
  550 :
  560 DEF PROCsetup
  570 ang     = 0
  580 x       = 0
  590 y       = 0
  600 oxcent  = 0
  610 oycent  = 0
  620 oscale  = 0
  630 oang    = 0
  640 oplot   = 0
  650 new     = TRUE
  660 cycle   = 1
  670 inc     = 2
  680 FOR col=0 TO 7
  690 READ vdu
  700 VDU 19,col,vdu;0;
  710 NEXT
  720 ENDPROC
  730 :
  740 DATA 0,4,1,5,2,6,3,7
  750 :
  760 DEF PROCa
  770 CLS
  780 x=0
  790 y=0
  800 oxcent=xcent
  810 oycent=ycent
  820 oscale=scale
  830 oang=ang
  840 oplot=plot
  850 new=FALSE
  860 colour=0
  870 count=0
  880 ENDPROC
```

Listing 5

```
   10 REM >Fire32 (Info5)
   20 REM by Ian Vibe
   30 REM for 32-bit machines
   40 REM (c) BAU March 1992
   50 :
   60 MODE 12
   70 OFF
   80 DIM c1%(15),c2%(15),c3%(15)
   90 FOR n%=1 TO 15
  100 f1%=24*n%
  110 f2%=f1%+120
  120 f3%=f1%+240
  130 c1%(n%)=128*(SINRADf1%+1)
  140 c2%(n%)=128*(SINRADf2%+1)
  150 c3%(n%)=128*(SINRADf3%+1)
  160 COLOUR n%,c1%(n%),c2%(n%),c3%(n%)
  170 NEXT
  180 REPEAT
  190 f%=1
  200 r%=0
  210 REPEAT
  220 GCOL f%
  230 f%=f% MOD 15+1
  240 FOR n%=0 TO 8 STEP 2
  250 CIRCLE 640,512,r%+n%
  260 CIRCLE 640,510,r%+n%
  270 IF TIME>=4 PROCs:TIME=0
  280 NEXT
  290 r%+=n%
  300 UNTIL r%>820
  310 FOR n%=1 TO 6
  320 a%=RND(30)+20
  330 z=RND(1)+1
  340 f%=RND(180)
  350 FOR x%=0 TO 1280 STEP 2
  360 y%=a%*SINRAD(x%*z+f%)
  370 RECTANGLE FILL x%,0,0,1020 TO x%,y
%
  380 IF TIME>=4 PROCs:TIME=0
  390 NEXT
  400 a%=RND(30)+20
  410 z=RND(1)+1
  420 f%=RND(180)
  430 FOR y%=0 TO 1024 STEP 4
  440 x%=a%*SINRAD(y%*z+f%)
  450 RECTANGLE FILL 0,y%,1280,0 TO x%,y
%
  460 IF TIME>=4 PROCs:TIME=0
  470 NEXT
  480 NEXT
  490 TIME=0
```

```
500 REPEAT
510 PROCs
520 k=INKEY(4)
530 UNTIL TIME>=3000
540 UNTIL FALSE
550 :
560 DEF PROCs
570 LOCAL n%
580 c1%(0)=c1%(15)
590 c2%(0)=c2%(15)
600 c3%(0)=c3%(15)
610 FOR n%=14 TO 0 STEP -1
620 c1%(n%+1)=c1%(n%)
630 c2%(n%+1)=c2%(n%)
640 c3%(n%+1)=c3%(n%)
650 NEXT
660 FOR n%=1 TO 15
670 COLOUR n%,c1%(n%),c2%(n%),c3%(n%)
680 NEXT
690 ENDPROC
```

Listing 6

```
10 REM >Fire8 (Info6)
20 REM by Dave Acton
30 REM for eight-bit machines
40 REM (c) BAU March 1992
50 :
60 MODE 2
70 VDU 23;8202;0;0;0;19,15,0,0,0,0
80 DIM code% &180,lo% 32,hi% 32
90 DIM sqlo% 256,sqhi% 256,col% 256
100 FOR i%=0 TO 255
110 a%=i%*i%
120 sqlo%?i%=a% MOD 256
130 sqhi%?i%=a% DIV 256
140 GCOL 0,i% MOD 15
150 PLOT 69,8,1023
160 col%?i%=?&3000
170 NEXT
180 :
190 FOR i%=0 TO 31
200 a%=&3000+640*i%
210 lo%?i%=a% MOD 256
220 hi%?i%=a% DIV 256
230 NEXT
240 :
250 shift=&80
260 dir=&81
270 x=&82
280 y=&83
290 FOR pass%=0 TO 2 STEP 2
300 P%=code%
310 [OPT pass%
320 .setup
330 LDA #0
340 STA dir
350 LDA #79
360 STA x
370 :
380 .setuploop1
390 JSR cycle
400 LDA #127
410 STA y
420 :
430 .setuploop2
440 LDA #80
450 SEC
460 SBC x
470 TAX
480 LDA #128
490 SEC
500 SBC y
510 LSR A
520 TAY
530 LDA sqlo%,X
540 CLC
550 ADC sqlo%,Y
560 STA &74
570 LDA sqhi%,X
580 ADC sqhi%,Y
590 STA &75
600 LDX #255
610 :
620 .findsq
630 INX
640 LDA sqhi%,X
650 CMP &75
660 BCC findsq
670 BNE foundsq
680 LDA sqlo%,X
690 CMP &74
700 BCC findsq
710 :
720 .foundsq
730 LDA col%,X
740 STA &72
750 LDX x
760 LDY y
770 JSR plot
780 LDA #159
790 SEC
800 SBC x
810 TAX
820 JSR plot
830 TYA
840 EOR #255
850 TAY
860 JSR plot
870 LDX x
880 JSR plot
890 DEC y
900 BPL setuploop2
910 DEC x
920 BPL setuploop1
930 RTS
940 :
950 .init
960 STA shift
970 CMP #0
980 BPL init2
990 LDA #64
1000 STA dir
1010 LDA #0
1020 SEC
1030 SBC shift
1040 STA shift
1050 RTS
1060 :
1070 .init2
1080 LDA #0
1090 STA dir
1100 RTS
1110 :
1120 .shiftcol
1130 JSR init
1140 ASL dir
1150 LDY #0
1160 :
1170 .shiftcolloop
1180 TYA
1190 PHA
1200 CLC
1210 ADC shift
1220 BCS off1
1230 TAY
1240 JSR peek
1250 JMP on1
1260 :
1270 .off1
1280 LDA #&55
1290 STA &72
1300 :
1310 .on1
1320 PLA
1330 TAY
1340 JSR plot
1350 INY
1360 BNE shiftcolloop
1370 RTS
1380 :
1390 .shiftrow
1400 JSR init
1410 LDX #0
1420 :
1430 .shiftrowloop
1440 TXA
1450 PHA
1460 CLC
1470 ADC shift
1480 CMP #160
1490 BCS off2
1500 TAX
1510 JSR peek
1520 JMP on2
1530 :
1540 .off2
1550 LDA #&55
1560 STA &72
1570 :
1580 .on2
1590 PLA
1600 TAX
1610 JSR plot
1620 INX
1630 CPX #160
1640 BNE shiftrowloop
1650 RTS
1660 :
1670 .peek
1680 TXA
1690 PHA
1700 TYA
1710 PHA
1720 JSR getaddr
1730 TXA
1740 AND #1
1750 BNE peek2
1760 LDA (&70),Y
1770 LSR A
1780 JMP peek3
1790 :
1800 .peek2
1810 LDA (&70),Y
1820 :
1830 .peek3
1840 AND #&55
1850 STA &72
1860 PLA
1870 TAY
1880 PLA
1890 TAX
1900 RTS
1910 :
1920 .plot
1930 LDA &72
1940 PHA
1950 TXA
1960 PHA
1970 TYA
1980 PHA
1990 JSR getaddr
2000 TXA
2010 AND #1
2020 BNE plot2
2030 ASL &72
2040 LDA (&70),Y
2050 AND #&55
2060 JMP plot3
2070 :
2080 .plot2
2090 LDA (&70),Y
2100 AND #&AA
2110 :
2120 .plot3
2130 ORA &72
2140 STA (&70),Y
2150 PLA
2160 TAY
2170 PLA
2180 TAX
2190 PLA
2200 STA &72
2210 RTS
2220 :
2230 .getaddr
2240 BIT dir
2250 BPL dontinvy
2260 TYA
2270 EOR #255
2280 TAY
2290 :
2300 .dontinvy
2310 BIT dir
2320 BVC dontinvx
2330 STX &73
2340 LDA #159
2350 SEC
2360 SBC &73
2370 TAX
2380 :
2390 .dontinvx
2400 LDA #0
2410 STA &71
2420 TXA
2430 AND #254
2440 ASL A
2450 ROL &71
2460 ASL A
2470 ROL &71
2480 STA &70
2490 TYA
2500 AND #7
2510 ORA &70
2520 STA &70
2530 TYA
2540 LSR A
2550 LSR A
2560 LSR A
2570 TAY
2580 LDA lo%,Y
2590 CLC
2600 ADC &70
2610 STA &70
2620 LDA hi%,Y
2630 ADC &71
2640 STA &71
2650 LDY #0
2660 RTS
2670 :
2680 .cycle
2690 LDX #14
2700 :
2710 .cycleloop
2720 LDA #19
2730 JSR &FFEE
2740 TXA
2750 JSR &FFEE
2760 TXA
2770 CLC
2780 ADC stage
2790 AND #15
2800 LSR A
2810 LSR A
2820 TAY
2830 LDA cols,Y
2840 JSR &FFEE
2850 LDA #0
2860 JSR &FFEE
2870 JSR &FFEE
2880 JSR &FFEE
2890 DEX
2900 BPL cycleloop
2910 DEC stage
2920 RTS
2930 :
2940 .stage EQUB 0
2950 .cols  EQUD &1050705
2960 ]
2970 NEXT pass%
2980 :
2990 CALL setup
3000 FOR n%=1 TO 3
3010 a%=RND(8)+6
3020 z=RND(1)+1
3030 f%=RND(180)
3040 FOR X%=0 TO 159
3050 CALL cycle
3060 A%=a%*SINRAD((8*X%)*z+f%)
3070 CALL shiftcol
3080 NEXT
3090 a%=RND(4)+3
3100 z=RND(1)+1
3110 f%=RND(180)
3120 FOR Y%=0 TO 255
3130 CALL cycle
3140 A%=a%*SINRAD(4*Y%*z+f%)
3150 CALL shiftrow
3160 NEXT
3170 NEXT
3180 REPEAT
3190 *FX 19
3200 CALL cycle
3210 UNTIL FALSE
3220 END
```

Listing 7

```
10 REM >Henon curve plotter (Info7)
20 REM by Michael Rozdoba
30 REM For 32-bit machines
40 REM (C) BAU March 1992
50 :
60 ON ERROR ON:REPORT:PRINT" at line
";ERL:END
70 PROCinitialise
80 CLS
90 CALL henon
100 END
110 :
120 DEF PROCinitialise
130 SYS "OS_Byte",161,133 TO ,,type%
140 type%=(type% AND 12) DIV 4
150 IF type%=1 THEN
160 MODE 18
170 v%=512
180 m2%=&FFFFFFFE
190 ELSE
200 MODE 0
210 v%=256
220 m2%=&FFFFFFFC
230 ENDIF
240 COLOUR 1,255,255,0
250 OFF
260 PROCassemble
270 zoom=.9
280 PROCset(azoom,zoom)
290 PROCset(aunzm,1/zoom)
300 MOUSE OFF
310 MOUSE RECTANGLE -1024,-1024,2048,2
048
320 ENDPROC
330 :
340 DEF PROCassemble
350 mem%=2048
360 DIM code% mem%
370 !code%=148
380 code%!4=-1
390 SYS "OS_ReadVduVariables",code%,co
de%
400 scrst=!code%
410 L%=code%+mem%
420 FOR pass%=8 TO 10 STEP 2
430 P%=code%
440 [OPT pass%
450 .aniter EQUD 3000
460 .acount EQUD 0
470 .aa     EQUD 0
480 .ab     EQUD 0
490 .as     EQUD 197
500 .axm    EQUD &66F5C2
510 .aym    EQUD &14978D
520 .ascrst EQUD scrst+40*v%+40
530 .ax     EQUD 0:EQUD &A990DEE2
540 EQUD &00000000
550 .ay     EQUD 1:EQUD &F3F039B8
560 EQUD &FFFFFFFC
570 .stmpos EQUB 3:EQUB 0:EQUB 0
580 EQUB 0:EQUB 0:ALIGN
590 .henon
600 STMFD   R13!,{R14}
610 :
620 .mainloop
630 MOV     R0,#21
640 ADR     R1,stmpos
650 SWI     "OS_Word"
660 :
670 ADR     R14,ax
680 LDMIA   R14,{R0-R5}
690 LDR     R11,aniter
700 STR     R11,acount
710 :
720 .loop
730 CMP     R4,#0
740 RSBNE   R9,R5,#1
750 MOVNE   R4,R4,LSR R9
760 CMPNE   R3,#0
770 ADDEQ   R7,R4,#(1<<31)
780 MOVEQ   R8,#1
790 MOVNE   R8,#0
800 RSBNE   R4,R4,#(1<<31)
810 ADDNE   R7,R4,R4
820 MOV     R6,#0
830 MOV     R3,R0
840 MOV     R4,R1
850 SUB     R5,R2,#2
860 ADD     R2,R2,R2
870 MOV     R10,#(1<<16)
880 SUB     R10,R10,#1
890 AND     R10,R10,R1
900 MOV     R1,R1,LSR #16
910 MUL     R9,R10,R10
920 MUL     R0,R10,R1
930 MUL     R10,R1,R1
940 ADDS    R0,R0,R0
950 ADDCS   R10,R10,#(1<<16)
960 ADDS    R9,R9,R0,LSL #16
970 ADCS    R1,R10,R0,LSR #16
980 ADDPL   R1,R1,R1
990 SUBPL   R2,R2,#1
1000 MOVPL  R10,R9,LSR #31
1010 ORRPL  R1,R1,R10
1020 MOV    R0,#1
1030 :
1040 ADDS   R1,R1,R1,LSR #1
1050 MOVCS  R1,R1,RRX
1060 ADDCS  R2,R2,#1
1070 CMP    R1,#0
1080 MOVEQ  R0,R6
1090 MOVEQ  R1,R7
1100 MOVEQ  R2,R8
1110 BEQ    adddone
1120 SUBS   R9,R2,R8
1130 SUBMI  R9,R8,R2
1140 MOVPL  R7,R7,LSR R9
1150 MOVMI  R1,R1,LSR R9
1160 MOVMI  R2,R8
1170 CMP    R0,R6
1180 BEQ    addpt
1190 SUBS   R1,R1,R7
1200 BEQ    adddone
1210 MOVLO  R0,R6
1220 RSBLOS R1,R1,#0
1230 :
1240 .addloop
```

```
1250 SUBPL   R2,R2,#1
1260 ADDPLS  R1,R1,R1
1270 BPL     addloop
1280 B       adddone
1290 :
1300 .addpt
1310 ADDS    R1,R1,R7
1320 MOVCS   R1,R1,RRX
1330 ADDCS   R2,R2,#1
1340 :
1350 .adddone
1360 RSB     R14,R2,#10
1370 MOV     R9,R1,LSR R14
1380 RSB     R14,R5,#10
1390 MOV     R10,R4,LSR R14
1400 CMP     R0,#1
1410 RSBEQ   R9,R9,#0
1420 CMP     R3,#1
1430 RSBEQ   R10,R10,#0
1440 STMFD   R13!,{R0-R5}
1450 ADR     R14,aa
1460 LDMIA   R14,{R0-R5}
1470 SUBS    R9,R9,R0
1480 MOVPL   R0,R9
1490 RSBMI   R0,R9,#0
1500 SUBS    R10,R1,R10
1510 MOVPL   R1,R10
1520 RSBMI   R1,R10,#0
1530 CMP     R0,R3
1540 BGE     next
1550 CMP     R1,R4
1560 BGE     next
1570 MUL     R9,R2,R9
1580 MUL     R10,R2,R10
1590 MOV     R1,R9,ASR #22
1600 MOV     R2,R10,ASR #21+(v%=512)
1610 ADD     R2,R2,R2,ASL #2
1620 ADD     R5,R5,R2,ASL #4
1630 LDRB    R14,[R5,R1,ASR #3]!
1640 AND     R1,R1,#7
1650 MOV     R2,#1
1660 MOV     R2,R2,LSL R1
1670 ORR     R14,R14,R2
1680 STRB    R14,[R5]
1690 :
1700 .next
1710 LDMFD   R13!,{R0-R5}
1720 LDR     R11,acount
1730 SUBS    R11,R11,#1
1740 STR     R11,acount
1750 BNE     loop
1760 ADR     R14,ax
1770 STMIA   R14,{R0-R5}
1780 SWI     "OS_ReadEscapeState"
1790 LDMCSFD R13!,{PC}^
1800 SWI     "OS_Mouse"
1810 CMP     R2,#0
1820 BEQ     mainloop
1830 ADR     R14,amasks
1840 LDMIA   R14,{R3,R4}
1850 AND     R0,R0,R3
1860 AND     R1,R1,R4
1870 TST     R2,#2
1880 BEQ     checkselect
1890 STMFD   R13!,{R2}
1900 MOV     R9,R0
1910 MOV     R10,R1
1920 MOV     R0,#4
1930 MOV     R1,#1280
1940 SUB     R1,R1,#1
1950 MOV     R2,#1024
1960 SUB     R2,R2,#1
1970 SWI     "OS_Plot"
1980 MOV     R0,#4
1990 MOV     R1,#0
2000 MOV     R2,#0
2010 SWI     "OS_Plot"
2020 MOV     R0,#185
2030 RSB     R1,R9,#0
2040 RSB     R2,R10,#0
2050 SWI     "OS_Plot"
2060 CMP     R9,#0
2070 MOVPL   R3,#0
2080 MOVMI   R3,#1
2090 RSBMI   R9,R9,#0
2100 MOV     R5,#22
2110 MOVS    R4,R9
2120 BEQ     12
2130 :
2140 .11
2150 MOVS    R4,R4,LSL #1
2160 SUB     R5,R5,#1
2170 BPL     11
2180 :
2190 .12
2200 ADR     R14,afx
2210 STMIA   R14,{R3-R5}
2220 CMP     R10,#0
2230 MOVPL   R3,#0
2240 MOVMI   R3,#1
2250 RSBMI   R10,R10,#0
2260 MOV     R5,#22
2270 MOVS    R4,R10
2280 BEQ     14
2290 :
2300 .13
2310 MOVS    R4,R4,LSL #1
2320 SUB     R5,R5,#1
2330 BPL     13
2340 :
2350 .14
2360 ADR     R14,afs
2370 LDMIA   R14,{R0-R2}
2380 FNmul
2390 ADR     R14,afb
2400 LDMIA   R14,{R3-R5}
2410 FNadd
2420 ADR     R14,afb
2430 STMIA   R14,{R0-R2}
2440 RSB     R2,R2,#12
2450 MOV     R1,R1,LSR R2
2460 CMP     R0,#1
2470 RSBEQ   R1,R1,#0
2480 STR     R1,ab
2490 ADR     R14,afs
2500 LDMIA   R14,{R0-R2}
2510 ADR     R14,afx
2520 LDMIA   R14,{R3-R5}
2530 FNmul
2540 ADR     R14,afa
2550 LDMIA   R14,{R3-R5}
2560 FNadd
2570 ADR     R14,afa
2580 STMIA   R14,{R0-R2}
2590 RSB     R2,R2,#10
2600 MOV     R1,R1,LSR R2
2610 CMP     R0,#1
2620 RSBEQ   R1,R1,#0
2630 STR     R1,aa
2640 LDMFD   R13!,{R2}
2650 :
2660 .checkselect
2670 TST     R2,#4
2680 BEQ     checkadjust
2690 ADR     R0,azoom
2700 BL      rescale
2710 B       mainloop
2720 :
2730 .checkadjust
2740 TST     R2,#1
2750 BEQ     mainloop
2760 LDR     R0,as
2770 CMP     R0,#128
2780 BLE     mainloop
2790 ADR     R0,aunzm
2800 BL      rescale
2810 B       mainloop
2820 :
2830 .amasks EQUD &FFFFFFFE:EQUD m2%
2840 .afs    EQUD 0:EQUD &A6666666
2850 EQUD 2
2860 .afa    EQUD 0:EQUD 0:EQUD 0
2870 .afb    EQUD 0:EQUD 0:EQUD 0
2880 .afx    EQUD 0:EQUD 0:EQUD 0
2890 .azoom  EQUD 0:EQUD 0:EQUD 0
2900 .aunzm  EQUD 0:EQUD 0:EQUD 0
2910 .axmsc  EQUD 0:EQUD &9E666666
2920 EQUD 22
2930 .aymsc  EQUD 0:EQUD &FD70A3D6
2940 EQUD 19
2950 :
2960 .rescale
2970 STMFD   R13!,{R14}
2980 LDMIA   R0,{R0-R2}
2990 ADR     R14,afs
3000 LDMIA   R14,{R3-R5}
3010 FNmul
3020 ADR     R14,afs
3030 STMIA   R14,{R0-R2}
3040 FNmov(10,0)
3050 ADR     R14,axmsc
3060 LDMIA   R14,{R3-R5}
3070 FNmul
3080 RSB     R2,R2,#32
3090 MOV     R1,R1,LSR R2
3100 CMP     R0,#1
3110 RSBEQ   R1,R1,#0
3120 STR     R1,axm
3130 FNmov(0,10)
3140 ADR     R14,aymsc
3150 LDMIA   R14,{R3-R5}
3160 FNmul
3170 RSB     R2,R2,#32
3180 MOV     R1,R1,LSR R2
3190 CMP     R0,#1
3200 RSBEQ   R1,R1,#0
3210 STR     R1,aym
3220 FNmov(3,10)
3230 MOV     R0,#0
3240 MOV     R1,#(1<<31)
3250 MOV     R2,#10
3260 FNdiv
3270 RSB     R2,R2,#31
3280 MOV     R1,R1,LSR R2
3290 CMP     R0,#1
3300 RSBEQ   R1,R1,#0
3310 ADD     R1,R1,#1
3320 MOV     R1,R1,ASR #1
3330 STR     R1,as
3340 SWI     256+12
3350 LDMFD   R13!,{PC}
3360 :
3370 .mul    FNmulass
3380 MOV     PC,R14
3390 .add    FNaddass
3400 MOV     PC,R14
3410 .div    FNdivass
3420 MOV     PC,R14
3430 ]
3440 NEXT
3450 ENDPROC
3460 :
3470 :
3480 DEF FNmov(d%,l%)
3490 [OPT pass%
3500 MOV     d%,l%
3510 MOV     (d%+1),(l%+1)
3520 MOV     (d%+2),(l%+2)
3530 ]
3540 =0
3550 DEF FNaddass
3560 [OPT pass%
3570 CMP     R4,#0
3580 BEQ     P%+4*24
3590 CMP     R1,#0
3600 MOVEQ   R0,R3
3610 MOVEQ   R1,R4
3620 MOVEQ   R2,R5
3630 BEQ     P%+4*19
3640 SUBS    R6,R2,R5
3650 SUBMI   R6,R5,R2
3660 MOVPL   R4,R4,LSR R6
3670 MOVMI   R1,R1,LSR R6
3680 MOVMI   R2,R5
3690 CMP     R0,R3
3700 BEQ     P%+4*9
3710 SUBS    R1,R1,R4
3720 BEQ     P%+4*10
3730 MOVLO   R0,R3
3740 RSBLOS  R1,R1,#0
3750 SUBPL   R2,R2,#1
3760 MOVPLS  R1,R1,LSL #1
3770 BPL     P%-4*2
3780 B       P%+4*4
3790 ADDS    R1,R1,R4
3800 MOVCS   R1,R1,RRX
3810 ADDCS   R2,R2,#1
3820 ]
3830 =0
3840 DEF FNadd
3850 [OPT pass%
3860 BL      add
3870 ]
3880 =0
3890 DEF FNmulass
3900 [OPT pass%
3910 EOR     R0,R0,R3
3920 ADD     R2,R2,R5
3930 MOV     R6,#1<<16
3940 SUB     R6,R6,#1
3950 MOV     R7,R1,LSR #16
3960 MOV     R8,R4,LSR #16
3970 AND     R1,R1,R6
3980 AND     R4,R4,R6
3990 MUL     R9,R1,R4
4000 MUL     R6,R7,R8
4010 MUL     R7,R4,R7
4020 MUL     R8,R1,R8
4030 ADDS    R7,R7,R8
4040 ADDCS   R6,R6,#1<<16
4050 ADDS    R9,R9,R7,LSL #16
4060 ADCS    R1,R6,R7,LSR #16
4070 MOVPL   R1,R1,LSL #1
4080 SUBPL   R2,R2,#1
4090 MOVPL   R6,R9,LSR #31
4100 ORRPL   R1,R1,R6
4110 ]
4120 =0
4130 DEF FNmul
4140 [OPT pass%
4150 BL      mul
4160 ]
4170 =0
4180 DEF FNdivass
4190 [OPT pass%
4200 SUB     R2,R2,R5
4210 EOR     R0,R0,R3
4220 MOV     R6,#0
4230 MOV     R7,R1
4240 MOV     R1,#0
4250 MOV     R8,#32
4260 CMP     R6,#1
4270 CMPLO   R7,R4
4280 ADD     R1,R1,R1
4290 ADDHS   R1,R1,#1
4300 ADDLO   R6,R6,#1
4310 SUBHSS  R7,R7,R4
4320 SBC     R6,R6,#0
4330 ADDS    R7,R7,R7
4340 ADC     R6,R6,R6
4350 SUBS    R8,R8,#1
4360 BNE     P%-4*10
4370 CMP     R6,#1
4380 CMPLO   R7,R4
4390 ADCS    R1,R1,R1
4400 MOVCS   R1,R1,RRX
4410 ADDCS   R2,R2,#1
4420 ]
4430 =0
4440 DEF FNdiv
4450 [OPT pass%
4460 BL      div
4470 ]
4480 =0
4490 DEF PROCset(a%,n)
4500 LOCAL A%,B%,C%,an
4510 IF n=0 THEN
4520 A%=0
4530 B%=0
4540 C%=0
4550 ELSE
4560 A%=(1-SGN n)/2
4570 an=ABSn
4580 C%=INT(LNan/LN2+1+1E-8)
4590 B%=((an*2^(31-C%))<<1)
4600 ENDIF
4610 !a%=A%
4620 a%!4=B%
4630 a%!8=C%
4640 ENDPROC
```

Listing 8

```
10 REM >Handy32 (Info8)
20 REM by Dave Acton
30 REM for 32-bit machines
40 REM (c) BAU March 1992
50 :
60 DIM code% &400
70 eventv=&10
80 sp=13:link=14:pc=15
90 FOR pass%=4 TO 6 STEP 2
100 P%=0
110 O%=code%
120 [OPT pass%
130 EQUD 0
140 EQUD 0
150 EQUD quit
160 EQUD 0
170 EQUD title
180 EQUD help
190 EQUD commandtable
200 :
210 .title EQUS     "Handy"
220 EQUB   0
230 ALIGN
240 :
250 .help  EQUS     "Handy"+CHR$9+CHR$9+"1.00 (04 Jan 1992)"
260 EQUB   0
270 ALIGN
280 :
290 .quit  STMFD    (sp)!,{link}
300 BL     off
310 LDMFD  (sp)!,{pc}
320 :
330 .commandtable
340 EQUS   "HandyOn"
350 EQUB   0
360 ALIGN
370 EQUD   on
380 EQUD   0
390 EQUD   onsyn
400 EQUD   onhlp
410 EQUS   "HandyOff"
420 EQUB   0
430 ALIGN
440 EQUD   off
450 EQUD   0
460 EQUD   offsyn
470 EQUD   offhlp
480 EQUD   0
490 :
500 .onhlp  EQUS    "*"+CHR$27+CHR$0+" enables the SHIFT/CTRL lock."
510 EQUB    13
520 .onsyn  EQUS    CHR$27+CHR$1
530 EQUB    0
540 .offhlp EQUS    "*"+CHR$27+CHR$0+" disables the SHIFT/CTRL lock."
550 EQUB    13
560 .offsyn EQUS    CHR$27+CHR$1
570 EQUB    0
580 :
590 .on    BIC      link,link,#1<<28
600 STMFD  (sp)!,{r0-r12,link}
610 MOV    r3,#14
620 B      cutin
630 .off   BIC      link,link,#1<<28
640 STMFD  (sp)!,{r0-r12,link}
650 MOV    r3,#13
660 .cutin LDR      r0,inuse
670 CMP    r0,r3
680 LDMEQFD (sp)!,{r0-r12,pc}
690 MOV    r0,#eventv
700 ADR    r1,event
710 MOV    r2,#0
720 CMP    r3,#14
730 SWIEQ  "XOS_Claim"
740 CMP    r3,#13
750 SWIEQ  "XOS_Release"
760 MOV    r0,r3
770 MOV    r1,#11
780 SWI    "XOS_Byte"
790 MOV    r1,#2
800 SWI    "XOS_Byte"
810 STR    r3,inuse
820 LDMFD  (sp)!,{r0-r12,pc}
830 :
840 .mask  EQUD     0
850 .inuse EQUD     13
860 :
870 .keys  EQUD     &3B40
880 EQUD   &6140
890 EQUD   &4C08
900 EQUD   &5808
910 EQUD   -1
920
930 .event STMFD    (sp)!,{r0-r12,link}
940 CMP    r0,#2
950 MOVEQ  r1,#1
960 BEQ    callb
970 CMP    r0,#11
980 CMPEQ  r1,#0
990 LDMNEFD (sp)!,{r0-r12,pc}^
1000 ADR   r3,keys
1010 :
1020 .findk LDR     r0,[r3],#4
1030 CMP   r0,#0
1040 LDMLTFD (sp)!,{r0-r12,pc}^
1050 CMP   r2,r0,LSR #8
1060 BNE   findk
1070 LDRB  r1,mask
1080 EOR   r0,r0,r1
1090 STRB  r0,mask
1100 MOV   r1,#0
1110 :
1120 .callb ADR     r0,set
1130 MOV   r9,pc
1140 ORR   r8,r9,#3
1150 TEQP  r8,#0
1160 MOVNV r0,r0
1170 STMFD (sp)!,{link}
1180 SWI   "XOS_AddCallBack"
1190 LDMFD (sp)!,{link}
1200 TEQP  r9,#0
1210 MOVNV r0,r0
1220 LDMFD (sp)!,{r0-r12,pc}^
1230 :
1240 .set  STMFD    (sp)!,{r0-r12,link}
1250 MOV   r0,#202
1260 MOV   r1,#0
1270 MOV   r2,#255
1280 SWI   "XOS_Byte"
```

```
1290 LDRB    r3,mask
1300 CMP     r12,#Ø
1310 ORREQ   r1,r1,r3
1320 BICNE   r1,r1,r3
1330 MOV     r2,#Ø
1340 STRNE   r2,mask
1350 SWI     "XOS_Byte"
1360 LDMFD   (sp)!,{rØ-r12,pc}^
1370 ]
1380 NEXT pass%
1390 SYS "OS_File",1Ø,"Handy",&FFA,,cod
e%,O%
1400 END
```

Listing 9

```
10 REM >Handy8 (Info9)
20 REM by Dave Acton
30 REM for eight-bit machines
40 REM (c) BAU March 1992
50 :
60 bytev=&2ØA
70 rdchv=&21Ø
80 eventv=&22Ø
90 keyv=&228
100 osbyte=&FFF4
110 FOR pass%=Ø TO 2 STEP 2
120 P%=&9ØØ
130 [OPT pass%
140 SEI
150 OPT FNr(eventv,oldevent+1,myevent)
160 OPT FNr(rdchv,oldrdch+1,myrdch)
170 OPT FNr(bytev,oldbyte+1,mybyte)
180 CLI
190 LDA #14
200 LDX #4
210 JMP osbyte
220 :
230 .mybyte
240 CMP #129
250 BNE mybyte2
260 CPY #255
270 BNE inkeyplus
280 CPX #254
290 BCC mybyte2
300 BEQ inkeyminus2
310 LDA mask
320 AND #128
330 JMP mybyte1
340 :
350 .inkeyminus2
360 LDA mask
370 AND #64
380 :
390 .mybyte1
400 PHP
410 LDA #129
420 LDX #Ø
430 LDY #Ø
440 PLP
450 BEQ isntpressed
460 DEX
470 DEY
480 :
490 .isntpressed
500 RTS
510 :
520 .inkeyplus
530 JSR oldbyte
540 PHP
550 CPY #Ø
560 BNE nokeypressed
570 STX temp+2
580 JSR convert
590 LDX temp+2
600 :
610 .nokeypressed
620 PLP
630 RTS
640 :
650 .mybyte2
660 .oldbyte
670 JMP &ABCD
680 :
690 .myrdch
700 .oldrdch'
710 JSR &ABCD
720 STA temp+2
730 :
740 .convert
750 PHP
760 TXA
770 PHA
780 TYA
790 PHA
800 BIT mask
810 BPL notctrl
820 LDA #227
830 JSR dofunc
840 BCC converted
850 LDA temp+2
860 CMP #64
870 BCC converted
880 CMP #64+32
890 BCS trylc
900 EOR #64
910 STA temp+2
920 JMP converted
930 :
940 .trylc
950 CMP #ASC"a"
960 BCC converted
970 CMP #ASC"z"+1
980 BCS converted
990 SEC
1000 SBC #96
1010 STA temp+2
1020 JMP converted
1030 :
1040 .notctrl
1050 BIT mask
1060 BVC converted
1070 LDA temp+2
1080 CMP #ASC"a"
1090 BCC checkshift
1100 CMP #ASC"z"+1
1110 BCS checkshift
1120 SBC #31
1130 BNE shifted ; = JMP
1140 :
1150 .checkshift
1160 LDA #226
1170 JSR dofunc
1180 BCC converted
1190 LDX #254
1200 :
1210 .findshift
1220 INX
1230 INX
1240 LDA shift,X
1250 BEQ converted
1260 CMP temp+2
1270 BNE findshift
1280 LDA shift+1,X
1290 :
1300 .shifted
1310 STA temp+2
1320 :
1330 .converted
1340 LDA #Ø
1350 STA mask
1360 PLA
1370 TAY
1380 PLA
1390 TAX
1400 LDA temp+2
1410 PLP
1420 RTS
1430 :
1440 .dofunc
1450 STA temp+5
1460 LDA #225
1470 JSR getfinfo
1480 BCC notfunc
1490 STX temp+3
1500 LDA temp+2
1510 CMP temp+3
1520 BCC notfunc
1530 SEC
1540 SBC #16
1550 CMP temp+3
1560 BCS notfunc
1570 LDA temp+5
1580 JSR getfinfo
1590 BCC notfunc
1600 TXA
1610 CLC
1620 ADC temp+2
1630 SEC
1640 SBC temp+3
1650 STA temp+2
1660 CLC
1670 RTS
1680 :
1690 .notfunc
1700 SEC
1710 RTS
1720 :
1730 .getfinfo
1740 LDX #Ø
1750 LDY #255
1760 JSR osbyte
1770 CPX #2
1780 RTS
1790 :
1800 .shift
1810 EQUS "1!2""3#4$5%6&7'8(9)ØØ-=^~\|[
{]}_£;+:*,<.>/?"
1820 EQUB Ø
1830 :
1840 .myevent
1850 PHP
1860 PHA
1870 CMP #4
1880 BNE notourevent
1890 TXA
1900 PHA
1910 TYA
1920 PHA
1930 CLC
1940 CLV
1950 JSR callkeyv
1960 PHA
1970 AND #64
1980 CMP status
1990 BEQ event2
2000 STA status
2010 CMP #Ø
2020 BEQ event2
2030 LDA mask
2040 EOR #64
2050 STA mask
2060 :
2070 .event2
2080 PLA
2090 AND #128
2100 CMP status+1
2110 BEQ eventdone
2120 STA status+1
2130 CMP #Ø
2140 BEQ eventdone
2150 LDA mask
2160 EOR #128
2170 STA mask
2180 :
2190 .eventdone
2200 PLA
2210 TAX
2220 PLA
2230 TAY
2240 :
2250 .notourevent
2260 PLA
2270 PLP
2280 :
2290 .oldevent
2300 JMP &ABCD
2310 :
2320 .callkeyv
2330 JMP (keyv)
2340 :
2350 .status   EQUW Ø
2360 .mask     EQUB Ø
2370 .temp     EQUD Ø:EQUW Ø
2380 ]
2390 NEXT pass%
2400 PRINT"Bytes used: ";P%-&9ØØ
2410 OSCLI("SAVE Handy 9ØØ "+STR$~P%)
2420 END
2430 :
2440 DEF FNr(v,o,m)
2450 [OPT pass%
2460 LDA v
2470 STA o
2480 LDA v+1
2490 STA o+1
2500 LDA #m MOD 256
2510 STA v
2520 LDA #m DIV 256
2530 STA v+1
2540 ]
2550 =pass%
```

Listing 10

```
10 REM >Predictor (Info1Ø)
20 REM Pools Predictor
30 REM by Robert Place
40 REM for all machines
50 REM (c) BAU March 1992
60 :
70 DIM name$(2),pre(2)
80 REPEAT
90 CLS
100 FOR r=1 TO 2
110 PRINT"Team ";r'
120 INPUT"Name: "name$(r)
130 INPUT"League position: "po
140 INPUT"Played: "p
150 INPUT"Won: "w
160 INPUT"Goals against: "a
170 pre(r)=(((2*p)/a*(p/w))*5)/po*4
180 PRINT"Rating for team ";r;"=";pre(
r)''
190 NEXT
200 IF pre(1)>pre(2) b=1 ELSE b=2
210 IF ABS(pre(1)-pre(2))<4 PRINT"Draw
" ELSE PRINT name$(b)" will win"
220 PRINT''"Press any key..."
230 wait=GET
240 UNTIL FALSE
```

Listing 11

```
10 REM >BugLand (Info11)
20 REM by Dave Acton
30 REM for 32-bit machines
40 REM (c) BAU March 1992
50 :
60 MODE 13
70 OFF
80 *FX 4,1
90 *POINTER 1
100 VDU 24,Ø;Ø;1Ø23;1Ø23;
110 PROCinit
120 PROCass
130 menu_item%=Ø
140 REPEAT
150 CLS
160 PROCmenu
170 gen%=Ø
180 PROCclear_pop
190 PROCreset_sprite
200 PROCfeed(initfeed%)
210 !select=-1
220 REPEAT
230 SYS &2E,34+512,sprite%,saddr%,Ø,Ø
240 IF !select>-1 THEN
250 CIRCLE 4*((!(!select+xpos%))>>>(32
-logs%)),1Ø23-4*((!(!select+ypos%))>>>(3
2-logs%)),16
260 ENDIF
270 date%=(date%+var%(Ø)) MOD year%
280 IF var%(2)=1 THEN
290 f%=var%(Ø)*var%(1)*(1+Ø.9*SIN(date
%/year%*2*PI))
300 IF f%<1 f%=1
310 PROCfeed(f%)
320 ELSE
330 f%=var%(Ø)*var%(1)
340 ENDIF
350 COLOUR 43
360 PRINTTAB(33,8);f%;"    "TAB(33,9);g
en%;TAB(33,1Ø);USR(pop);"  "
370 PROCfeed(f%)
380 FOR i%=1 TO var%(Ø)
390 CALL generate
400 NEXT
410 gen%+=var%(Ø)
420 PROCmouse
430 PROCtrace
440 ref_menu%=TRUE
450 shift%=1-9*INKEY-1
460 CASE INKEY$(Ø) OF
470 WHEN CHR$136:PROCset_var(-shift%)
480 WHEN CHR$137:PROCset_var(shift%)
490 WHEN CHR$138:menu_item%=(menu_item
%+1) MOD vars%
500 WHEN CHR$139:menu_item%=(menu_item
%+vars%-1) MOD vars%
510 OTHERWISE
520 ref_menu%=FALSE
530 ENDCASE
540 IF ref_menu% PROCmenu:*FX 15
550 UNTIL INKEY-52 AND INKEY-2
560 UNTIL FALSE
570 END
580 :
590 DEF PROCtrace
600 a%=!select
610 IF a%<>was_sel% THEN
620 was_sel%=a%
630 VDU 28,32,31,39,12,12,26,24,Ø;Ø;1Ø
23;1Ø23;
640 ENDIF
650 IF a%>Ø THEN
660 COLOUR 42
670 PRINTTAB(33,12)"E=";a%!energy%;"
"
680 PRINTTAB(33,13)"C=";a%?count%;" "
690 FOR i%=Ø TO progsize%-1
700 op%=a%?(i%+genes%) AND 7
710 par%=(a%?(i%+genes%))>>3
720 IF (a%!pc% AND (progsize%-1))=i% C
OLOUR 63 ELSE COLOUR 7
730 PRINTTAB(33,15+i%);i%;" ";LEFT$(co
m$(op%),1)" ";
740 CASE op% OF
750 WHEN 1,7:PRINT;INT(1ØØ*par%/32);"%
"
760 WHEN 2:PRINT;par% DIV 4;" ";(i%-(p
ar% MOD 4)) AND (progsize%-1)
770 WHEN 3:PRINT;">";par%
780 WHEN 4,5,6:PRINT;par% AND (progsiz
e%-1)
790 ENDCASE
800 NEXT
810 ENDIF
820 ENDPROC
830 :
840 DEF PROCset_var(d%)
850 var%(menu_item%)+=d%
860 IF var%(menu_item%)<min%(menu_item
%) var%(menu_item%)=min%(menu_item%)
870 IF var%(menu_item%)>max%(menu_item
%) var%(menu_item%)=max%(menu_item%)
880 ENDPROC
890 :
900 DEF PROCmenu
910 LOCAL i%
920 FOR i%=Ø TO vars%-1
930 IF i%=menu_item% COLOUR 63 TINT 19
2 ELSE COLOUR 15
940 PRINTTAB(33,i%*2)var_name$(i%)
950 COLOUR 7
960 PRINTTAB(34,i%*2+1)SPC6TAB(34,i%*2
+1);
970 IF i%<2 THEN
980 PRINT;var%(i%)
990 ELSE
1000 IF var%(i%)=Ø PRINT "No" ELSE PRIN
T "Yes"
1010 ENDIF
1020 NEXT
1030 IF var%(Ø)<>1 !select=-1
1040 ENDPROC
1050 :
1060 DEF PROCmouse
1070 MOUSE mx%,my%,mb%
1080 my%=1Ø23-my%
1090 IF (mb% AND 1)>Ø THEN
1100 PROCnew_bug(8ØØ,mx%/4,my%/4,"DESIG
NER")
1110 ENDIF
1120 IF (mb% AND 4)>Ø THEN
1130 bdist%=2Ø
1140 new%=-1
1150 a%=list!next%
1160 WHILE a%<>-1
1170 IF a%!energy%>-1 THEN
1180 dist%=SQR((((a%!xpos%)>>>(32-logs%
))-mx%/4)^2+(((a%!ypos%)>>>(32-logs%))-m
y%/4)^2)
1190 IF dist%<bdist% new%=a%:bdist%=dis
t%
1200 ENDIF
1210 a%=a%!next%
1220 ENDWHILE
1230 IF new%<>!select !select=new%
1240 ENDIF
1250 ENDPROC
1260 :
1270 DEF PROCfeed(A%)
1280 CALL feed
1290 ENDPROC
1300 :
1310 DEF PROCclear_pop
1320 !free=wk%
1330 list!next%=-1
1340 FOR i%=Ø TO bugs%-1
1350 a%=wk%+sizeof%*i%
1360 IF i%<bugs%-1 a%!next%=a%+sizeof%
ELSE a%!next%=-1
1370 NEXT
1380 FOR i%=1 TO 5Ø
1390 PROCnew_bug(8ØØ,FNrnd(side%),FNrnd
(side%),"RANDOM")
1400 NEXT
1410 ENDPROC
1420 :
1430 DEF PROCnew_bug(e%,x%,y%,prog$)
1440 LOCAL a%,i%
1450 IF !free<>-1 THEN
1460 a%=!free
1470 !free=a%!next%
```




```
1480 a%!next%=list!next%
1490 list!next%=a%
1500 aa%=a%+genes%
1510 a%!energy%=e%
1520 a%!xpos%=x%<<(32-logs%)
1530 a%!ypos%=y%<<(32-logs%)
1540 a%?pc%=0
1550 a%?dir%=FNrnd(4)
1560 a%?count%=0
1570 FOR k%=0 TO progsize%-1
1580 aa%?k%=FNopcode("JUMP")+(0<<3)
1590 NEXT
1600 CASE prog$ OF
1610 WHEN "RANDOM":
1620 FOR k%=0 TO progsize%-1
1630 k%?aa%=FNrnd(256)
1640 NEXT
1650 REPEAT
1660 a%?col%=FNrnd(128)
1670 UNTIL a%?col%<>foodbyte%
1680 WHEN "DESIGNER":
1690 aa%?0=FNopcode("MOVE") +(31<<3)
1700 aa%?1=FNopcode("SEE")  +( 0<<3)
1710 aa%?2=FNopcode("BREED")+(28<<3)
1720 aa%?3=FNopcode("TURN") +(10<<3)
1730 a%?col%=255
1740 OTHERWISE
1750 ERROR 0,"No such bug type as """+p
rog$+""""
1760 ENDCASE
1770 ENDIF
1780 ENDPROC
1790 :
1800 DEF FNopcode(o$)
1810 LOCAL i%
1820 i%=-1
1830 REPEAT
1840 i%+=1
1850 UNTIL i%=commands%-1 OR com$(i%)=o
$
1860 IF com$(i%)=o$ THEN =i%
1870 ERROR 17,"Unknown command: "+o$
1880 :
1890 DEF PROCinit
1900 year%=2000
1910 initfeed%=3000
1920 date%=0
1930 commands%=8
1940 DIM com$(commands%)
1950 com$()="X","TURN","LOOP","BREED","
ENERGY","SEE","JUMP","MOVE"
1960 bugs%=4096
1970 log2g=3
1980 progsize%=1<<log2g
1990 energy%=0
2000 xpos%  =4
2010 ypos%  =8
2020 genes% =12
2030 needed%=genes%+progsize%
2040 next%  =needed%+0
2050 pc%    =needed%+4
2060 col%   =needed%+5
2070 count% =needed%+6
2080 dir%   =needed%+7
2090 sizeof%=32
2100 food%=300
2110 maxen%=2048
2120 side%=256
2130 logs%=FNlog2(side%)
2140 ss%=&100+side%^2
2150 DIM sprite% ss%
2160 PROCreset_sprite
2170 SYS &2E,24+256,sprite%,"bugs" TO ,
,saddr%
2180 sdata%=saddr%+saddr%!32
2190 was_sel%=-1
2200 vars%=3
2210 DIM var_type%(vars%-1),var_name$(v
ars%-1)
2220 DIM min%(vars%-1),max%(vars%-1)
2230 DIM var%(vars%-1)
2240 var_name$()="Update","Food","Seaso
ns"
2250 min%()=1,1,0
2260 max%()=30,100,1
2270 var%()=4,6,0
2280 ENDPROC
2290 :
2300 DEF PROCreset_sprite
2310 !sprite%=ss%
2320 sprite%!4=0
2330 sprite%!8=16
2340 sprite%!12=16
2350 SYS &2E,15+256,sprite%,"bugs",0,si
de%,side%,13
2360 ENDPROC
2370 :
2380 DEF PROCass
2390 DIM code% &1000+(bugs%*sizeof%)
2400 foodbyte%=11
2410 sp=13:link=14:pc=15
2420 FOR pass%=0 TO 2 STEP 2
2430 P%=code%
2440 [OPT pass%
2450 .select EQUD    -1
2460 .free   EQUD    0
2470 .list   EQUS    STRING$(next%+4,"
")
2480 .base   EQUD    sdata%
2490 .feed
2500 STMFD   (sp)!,{r0-r12,link}
2510 LDR     r8,seed
2520 LDR     r9,eor
2530 MOV     r10,r0
2540 LDR     r11,base
2550 MOV     r4,#foodbyte%
2560 :
2570 .feedloop
2580 FNrand(3,logs%)
2590 FNrand(0,logs%)
2600 ADD     r1,r11,r0,LSL #logs%
2610 STRB    r4,[r1,r3]
2620 SUBS    r10,r10,#1
2630 BNE     feedloop
2640 STR     r8,seed
2650 LDMFD   (sp)!,{r0-r12,pc}
2660 :
2670 .generate
2680 STMFD   (sp)!,{r0-r12,link}
2690 ADR     r12,list
2700 LDR     r11,base
2710 LDR     r8,seed
2720 LDR     r9,eor
2730 :
2740 .bugloop
2750 MOV     r10,r12
2760 :
2770 .bugloopb
2780 LDR     r12,[r10,#next%]
2790 CMP     r12,#0
2800 STRLT   r8,seed
2810 LDMLTFD (sp)!,{r0-r12,pc}
2820 LDMIA   r12,{r5,r6,r7}
2830 ORR     r0,r7,r6,LSR #logs%
2840 MOV     r1,#0
2850 STRB    r1,[r11,r0,LSR #(32-2*logs
%)]
2860 ADD     r3,r12,#genes%
2870 LDR     r4,[r12,#pc%]
2880 AND     r0,r4,#progsize%-1
2890 LDRB    r0,[r3,r0]
2900 MOV     r1,r0,ASR #3
2910 AND     r0,r0,#7
2920 ADD     pc,pc,r0,LSL #2
2930 EQUS    "Fill"
2940 B       misc
2950 B       turn
2960 B       loop
2970 B       breed
2980 B       energy
2990 B       see
3000 B       jump
3010 :
3020 .move
3030 FNrand(0,5)
3040 CMP     r0,r1
3050 BGT     nextinst
3060 SUB     r5,r5,#10
3070 TST     r4,#(%10<<24)
3080 MOVEQ   r1,#1<<(32-logs%)
3090 MOVNE   r1,#&FF<<(32-logs%)
3100 TST     r4,#(%01<<24)
3110 ADDEQ   r7,r7,r1
3120 ADDNE   r6,r6,r1
3130 B       nextinst
3140 :
3150 .turn   FNrand(0,5)
3160 CMP     r0,r1
3170 BGT     nextinst
3180 MOV     r2,r4,LSR #24
3190 FNrand(0,1)
3200 ADDEQ   r2,r2,#1
3210 ADDNE   r2,r2,#3
3220 AND     r2,r2,#3
3230 STRB    r2,[r12,#dir%]
3240 B       nextinst
3250 :
3260 .loop
3270 MOV     r0,r4,LSL #8
3280 MOVS    r0,r0,LSR #24
3290 MOVEQ   r0,r1,LSR #2
3300 STREQB  r0,[r12,#count%]
3310 BEQ     loopback
3320 SUBS    r0,r0,#1
3330 STRB    r0,[r12,#count%]
3340 BEQ     nextinst
3350 :
3360 .loopback
3370 AND     r0,r1,#3
3380 SUB     r4,r4,r0
3390 B       didjump
3400 :
3410 .breed
3420 CMP     r5,r1,LSL #6
3430 BLT     nextinst
3440 LDR     r3,free
3450 CMP     r3,#0
3460 BLT     nextinst          ; no slots
free...
3470 LDR     r0,[r3,#next%]
3480 STR     r0,free           ; remove s
lot from free list
3490 LDR     r0,[r12,#next%]
3500 STR     r0,[r3,#next%]
3510 STR     r3,[r12,#next%] ; patch in
after parent
3520 MOV     r5,r5,ASR #1
3530 STR     r5,[r12,#energy%]
3540 LDMIA   r12,{r0-r2,r14}
3550 STMIA   r3,{r0-r2,r14}
3560 LDR     r14,[r12,#16]
3570 STR     r14,[r3,#16]
3580 FNrand(1,2)
3590 AND     r2,r4,#&FF00
3600 ORR     r0,r2,r1,LSL #24
3610 STR     r0,[r3,#pc%]
3620 :
3630 .mutate
3640 FNrand(0,3)
3650 BNE     nextinst
3660 MOV     r0,r2,LSR #8
3670 ADD     r0,r0,#7
3680 CMP     r0,#foodbyte%
3690 ADDEQ   r0,r0,#1
3700 STRB    r0,[r3,#col%]
3710 FNrand(0,log2g)
3720 ADD     r0,r0,r3
3730 FNrand(1,8)
3740 STRB    r1,[r0,#genes%]
3750 B       mutate
3760 :
3770 .energy
3780 CMP     r5,#256
3790 BGT     nextinst
3800 :
3810 .jump   MOV     r4,r1
3820 B       didjump
3830 :
3840 .see
3850 TST     r4,#(%10<<24)
3860 MOVEQ   r3,#1<<(32-logs%)
3870 MOVNE   r3,#&FF<<(32-logs%)
3880 TST     r4,#(%01<<24)
3890 BEQ     see3
3900 :
3910 .see2
3920 ADD     r2,r11,r7,LSR #(32-2*logs%
)
3930 MOV     r0,r6
3940 ]
3950 FOR it%=1 TO 10
3960 [OPT pass%
3970 ADD     r0,r0,r3
3980 LDRB    r14,[r2,r0,LSR #(32-logs%)
]
3990 CMP     r14,#foodbyte%
4000 BEQ     seefood
4010 ]
4020 NEXT it%
4030 [OPT pass%
4040 B       nextinst
4050 :
4060 .see3
4070 ADD     r2,r11,r6,LSR #(32-logs%)
4080 MOV     r0,r7
4090 ]
4100 FOR it%=1 TO 10
4110 [OPT pass%
4120 ADD     r0,r0,r3
4130 LDRB    r14,[r2,r0,LSR #(32-2*logs
%)]
4140 CMP     r14,#foodbyte%
4150 BEQ     seefood
4160 ]
4170 NEXT it%
4180 [OPT pass%
4190 B       nextinst
4200 :
4210 .seefood
4220 MOV     r4,r1
4230 B       didjump
4240 :
4250 .misc
4260 :
4270 .nextinst
4280 ADD     r4,r4,#1
4290 :
4300 .didjump
4310 STRB    r4,[r12,#pc%]
4320 ORR     r0,r7,r6,LSR #logs%
4330 LDRB    r1,[r11,r0,LSR #(32-2*logs
%)]
4340 CMP     r1,#foodbyte%
4350 ADDEQ   r5,r5,#food%
4360 CMP     r5,#maxen%
4370 MOVGT   r5,#maxen%
4380 SUBS    r5,r5,#1
4390 STMIA   r12,{r5,r6,r7}
4400 LDRPLB  r1,[r12,#col%]
4410 STRPLB  r1,[r11,r0,LSR #(32-2*logs
%)]
4420 BPL     bugloop
4430 LDR     r0,select
4440 CMP     r0,r12
4450 MVNEQ   r0,#0
4460 STREQ   r0,select
4470 LDR     r0,[r12,#next%]
4480 STR     r0,[r10,#next%] ; patch ou
t dead one
4490 LDR     r0,free
4500 STR     r0,[r12,#next%]
4510 STR     r12,free
4520 B       bugloopb
4530 :
4540 .brnd   STMFD   (sp)!,{r1-r12,link
}
4550 LDR     r8,seed
4560 LDR     r9,eor
4570 BL      rand
4580 STR     r8,seed
4590 LDMFD   (sp)!,{r1-r12,pc}
4600 :
4610 .rand
4620 MOV     r0,#1
4630 MOV     r0,r0,LSL r2
4640 SUB     r0,r0,#1
4650 :
4660 .randloop
4670 MOVS    r8,r8,LSL #1
4680 EORCS   r8,r8,r9
4690 SUBS    r2,r2,#1
4700 BNE     randloop
4710 AND     r0,r8,r0
4720 MOV     pc,link
4730 :
4740 .eor    EQUD    &1D872B41
4750 .seed   EQUD    RND
4760 .pop    STMFD   (sp)!,{r1,link}
4770 ADR     r1,list
4780 MOV     r0,#0
4790 :
4800 .pop2   LDR     r1,[r1,#next%]
4810 CMP     r1,#0
4820 ADDGT   r0,r0,#1
4830 BGT     pop2
4840 LDMFD   (sp)!,{r1,pc}
4850 ]
4860 WHILE (P% AND 15)>0
4870 P%+=4
4880 ENDWHILE
4890 wk%=P%
4900 NEXT pass%
4910 ENDPROC
4920 :
4930 DEF FNrand(reg,bit%)
4940 FOR r%=1 TO bit%
4950 [OPT pass%
4960 MOVS    r8,r8,LSL #1
4970 EORCS   r8,r8,r9
4980 ]
4990 NEXT r%
5000 [OPT pass%
5010 ANDS    reg,r8,#((1<<bit%)-1)
5020 ]
5030 =0
5040 :
5050 DEF FNlog2(n%)
5060 LOCAL l%
5070 l%=-1
5080 WHILE n%>0
5090 l%+=1
5100 n%=n%>>1
5110 ENDWHILE
5120 =l%
5130 :
5140 DEF FNrnd(n%)
5150 C%=FNlog2(n%)
5160 =USR(brnd)
```

Listing 12

```
10 REM >SpikesARC1 (Info12)
20 MODE 0:OFF:FOR I=1 TO 8:SYS 6,112,
I:CLS:NEXT:FOR N=10 TO 1 STEP -1:FOR I=1
 TO 8:SYS 6,112,I:Z=4*N:FOR Y=16*I-128 T
O 1152 STEP 128:FOR X=16*I-128 TO 1408 S
TEP 128:GX=(8-N)*(X-640)/30:GY=(8-N)*(Y-
512)/30:GCOL 0:CIRCLE FILL X+GX,Y+GY,Z:G
COL 1:CIRCLE X+GX,Y+GY,Z:NEXT:NEXT:NEXT:
NEXT:REPEAT:FOR I=1 TO 8:WAIT:SYS 6,113,
I:NEXT:UNTIL 0
```

ARM PROGRAMMING

Listing 1

```
 10 REM >ARM1 (Armprog1)
 20 REM By Dave Lawrence
 30 REM For 32 bit machines
 40 REM (C) BAU March 1992
 50 :
 60 DIM code 100
 70 link=14
 80 pc=15
 90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .addsub
130         MOV     R0,#5
140         MOV     R1,#9
150         ADD     R2,R0,R1
160         ADD     R0,R2,#7
170         MOV     R1,#3
180         SUB     R0,R0,R1
190   \      SUB     R0,R0,#1
200 rsb r0,r0,#30
210         MOV     pc,link
220 ]NEXT
230 PRINT "Press SPACE to run code";
240 IF GET
250 PRINT '"R0=";USR(addsub)
```

Listing 2

```
 10 REM >ARM2 (Armprog2)
 20 REM By Dave Lawrence
 30 REM For 32 bit machines
 40 REM (C) BAU March 1992
 50 :
 60 DIM code 100
 70 link=14
 80 pc=15
 90 FOR pass=0 TO 2 STEP 2
100 P%=code
110 [OPT pass
120 .mul
130         MOV     R1,#5
140         MOV     R2,#9
150         MUL     R0,R1,R2
160         MOV     R1,#2
170         MOV     R2,#10
180         MLA     R0,R1,R0,R2
200         MOV     pc,link
210 ]NEXT
220 PRINT "Press SPACE to run code";
230 IFGET
240 PRINT '"R0=";USR(mul)
```

PRINTERS

Listing 1

```
10 REM ESC/P2 Printer dump (Esc1)
20 REM by Malcom Brown
30 REM for all machines with ESC/P2 printers
40 REM (C) BAU Mar 92
50 :
60 MODE 0
70 VDU 2
80 :
90 REM -- Reset printer
100 VDU 1,27,1,64
110 :
120 REM -- Select raster graphics mode
130 VDU 1,27,1,40,1,71,1,1,1,0,1,1
140 :
150 REM -- Set vert & horiz resolution to 3600/20 dpi
160 V=20:H=20
170 :
180 REM -- Set vertical dot count to 1
190 N1=1
200 :
210 REM -- Set horizontal dot count to &50
220 N2=0:N3=5
230 :
240 REM -- Set movement unit to 20/3600 inch
250 VDU 1,27,1,40,1,85,1,1,1,0,1,20
260 :
270 REM -- Load screen image
280 *Load Screen 3000
290 :
300 FOR Y%=1023 TO 0 STEP -1
310 :
320 REM -- Output one line
330 PROCLINE(Y%)
340 :
350 REM -- Move down one movement unit
360 VDU 1,27,1,40,1,118,1,2,1,0,1,1,1,0
370 NEXT Y%
380 VDU 3:END
390 :
400 DEF PROCline(Y%)
410 REM -- Print raster graphics
420 VDU 1,27,1,46,1,0,1,V,1,H,1,N1,1,N2,1,N3
430 FOR X%=0 TO 1279 STEP 8
440 :
450 REM -- Output one byte
460 VDU 1,FNbyte(X%,Y%)
470 NEXT X%
480 :
490 REM -- Return to start of line
500 VDU 1,13
510 ENDPROC
520 :
530 DEF FNByte(X%,Y%)
540 D%=0
550 FOR N%=0 TO 7
560 :
570 REM -- Gather screen data for single dot
580 D%=D%+2^N%*POINT(X%+7-N%,Y%)
590 NEXT N%
600 =D%
```

Listing 2

```
10 REM Set character size (Esc2)
20 REM by Malcom Brown
30 REM for all machine with ESC/P@ printers
40 REM (c) BAU Mar 92
50 :
60 MODE 3
70 VDU 2
80 FOR P%=8 TO 32 STEP 2
90 REM -- SET POINT SIZE
100 VDU1,27,1,88,1,1,1,2*P%,1,0
110 REM -- PRINT CHARACTERS
120 PRINT"aA";
130 NEXT
140 VDU 3
```

LIQUID

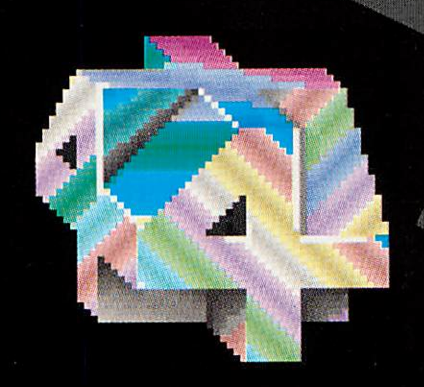
Listing 1

```
10 REM >Liquid (Liquid1)
20 REM by Mark A.Sidey
30 REM 32-bit machines only
40 REM (c) BAU Mar 92
50 :
60 ON ERROR PROCerror:PROCend:END
70 :
80 REPEAT
90 PROCset_variables
100 PROCassemble
110 REPEAT
120 PROCmenu
130 PROCset_up_screen
140 PROCset_flags
150 REPEAT
160 PROCmouse
170 PROCset_registers
180 CALL liquid%
190 UNTIL INKEY(-3)
200 REPEAT UNTIL NOT INKEY(-3)
210 UNTIL FALSE
220 END
230 :
240 DEF PROCmenu
250 MODE13
260 OFF
270 COLOUR %111100 TINT %11000000
280 PRINT"Liquid Flow simulator by M.Sidey"
290 PRINT"--------------------------------"
300 PRINT''"Select simulation type:"
310 COLOUR %111000 TINT %11000000
320 PRINT''"1: Single liquid, flowing down."
330 PRINT'"2: Two mixed liquids, flowing down."
340 PRINT'"3: Two separate liquids, flowing down."
350 PRINT'"4: Two liquids, one down, one up."
360 *FX21
370 REPEAT
380 A$=GET$
390 UNTIL A$>="1" AND A$<="4"
400 type%=VAL(A$)
410 IF type%=4 mirror%=TRUE ELSE mirror%=FALSE
420 ENDPROC
430 :
440 DEF PROCset_variables
450 DIM input% 100
460 DIM output% 100
470 !input%=149
480 !(input%+4)=-1
490 SYS "OS_ReadVduVariables",input%,output%
500 start_screen_address%=!output%
510 number_of_drops%=800
520 liquid1_colour%=%11001111
530 liquid2_colour%=%00010111
540 DIM liquid% 1000,position% 4*number_of_drops%,flag% number_of_drops%
550 ENDPROC
560 :
570 DEF PROCset_registers
580 B%=number_of_drops%
590 C%=position%
600 D%=flag%
610 E%=start_screen_address%+320*1+160
620 F%=start_screen_address%+320*254+160
630 ENDPROC
640 :
650 DEF PROCset_flags
660 FOR a%=flag% TO flag%+number_of_drops%
670 CASE type% OF
680 WHEN 1
690 ?a%=%001
700 WHEN 2
710 IF a% MOD 2=1 ?a%=%001 ELSE ?a%=%011
720 WHEN 3
730 IF (a%-flag%)<(number_of_drops% DIV 2) ?a%=%001 ELSE ?a%=%011
740 WHEN 4
750 IF a% MOD 2=1 ?a%=%001 ELSE ?a%=%111
760 ENDCASE
770 NEXT
780 ENDPROC
790 :
800 DEF PROCassemble
810 temporary=0
820 off_set=1
830 position_pointer=2
840 flag_pointer=3
850 top_position=4
860 bottom_position=5
870 flags=6
880 liquid_colour=7
890 black=8
900 position=9
910 left=10
920 heading=11
930 right=12
940 :
950 FOR pass%=0 TO 2 STEP 2
960 P%=liquid%
970 [OPT pass%
980 MOV black,#0
990 :
1000 .loop
1010 LDRB flags,[flag_pointer,off_set]
1020 ANDS temporary,flags,#1
1030 BNE start_drop
1040 MOV temporary,flags,LSR#1
1050 ANDS temporary,temporary,#1
1060 MOVEQ liquid_colour,#liquid1_colour%
1070 MOVNE liquid_colour,#liquid2_colour%
1080 LDR position,[position_pointer,off_set,LSL#2]
1090 STRB black,[position,#0]
1100 MOV temporary,flags,LSR#2
1110 ANDS temporary,temporary,#1
1120 CMP temporary,#0
1130 CMPEQ position,bottom_position
1140 BEQ finish_drop
1150 CMP temporary,#1
1160 CMPEQ position,top_position
1170 BEQ finish_drop
1180 CMP temporary,#1
1190 LDRNEB heading,[position,#320]
1200 LDREQB heading,[position,#-320]
1210 CMP heading,black
1220 BNE sides
1230 CMP temporary,#1
1240 ADDNE position,position,#320
1250 SUBEQ position,position,#320
1260 B output
1270 :
1280 .sides
1290 LDRB left,[position,#-1]
1300 LDRB right,[position,#1]
1310 CMP left,black
1320 BNE look_right
1330 CMP right,black
1340 BEQ both
1350 SUB position,position,#1
1360 B output
1370 :
1380 .look_right
1390 CMP right,black
1400 BNE stuck
1410 ADD position,position,#1
1420 B output
1430 :
1440 .both
1450 CMP heading,#255
1460 BEQ sort
1470 SWI "OS_ReadMonotonicTime"
1480 ANDS temporary,temporary,#1
1490 ADDEQ position,position,#1
1500 SUBNE position,position,#1
1510 B output
1520 :
1530 .sort
1540 MOV temporary,flags,LSR#1
1550 ANDS temporary,temporary,#1
1560 ADDEQ position,position,#1
1570 SUBNE position,position,#1
1580 B output
1590 :
1600 .stuck
1610 MOV temporary,flags,LSR#2
1620 ANDS temporary,temporary,#1
1630 LDREQB heading,[position,#-320]
1640 LDRNEB heading,[position,#320]
1650 CMP heading,black
1660 BNE output
1670 CMP temporary,#1
1680 SUBNE position,position,#320
1690 ADDEQ position,position,#320
1700 :
1710 .output
1720 STRB liquid_colour,[position,#0]
1730 STR position,[position_pointer,off_set,LSL#2]
1740 :
1750 .next
1760 SUBS off_set,off_set,#1
1770 BGT loop
1780 MOV PC,R14
1790 :
1800 .start_drop
1810 LDRB temporary,[top_position,#0]
1820 CMP temporary,black
1830 BNE next
1840 MOV temporary,flags,LSR#2
1850 ANDS temporary,temporary,#1
1860 MOVEQ position,top_position
1870 MOVNE position,bottom_position
1880 AND flags,flags,#%110
1890 STRB flags,[flag_pointer,off_set]
1900 B output
1910 :
1920 .finish_drop
1930 ORR flags,flags,#%001
1940 STRB flags,[flag_pointer,off_set]
1950 B next
1960 ]
1970 NEXT
1980 ENDPROC
1990 :
2000 DEF PROCset_up_screen
2010 MODE13
2020 OFF
2030 GCOL %001011 TINT 0
2040 RECTANGLE 0,0,1279,1023
2050 RECTANGLE 4,4,1268,1012
2060 IF mirror% VDU19,0,24,0,0,&50
2070 GCOL 0 TINT 0
2080 POINT 640,1016
2090 POINT 640,4
2100 VDU 24,8;8;1271;1012;
2110 *POINTER 1
2120 MOUSE COLOUR1,100,255,0
2130 MOUSE COLOUR2,0,255,0
2140 MOUSE STEP 1
2150 REPEAT
2160 PROCmouse
2170 IF INKEY(-68) GCOL %001011 TINT %01000000:RECTANGLE FILL0,0,1279,1023
2180 UNTIL INKEY(-3)
2190 REPEAT UNTIL NOT INKEY(-3)
2200 ENDPROC
2210 :
2220 DEF PROCmouse
2230 IF INKEY(-50) THEN
2240 MOUSE STEP 0,1
2250 ELSE
2260 IF INKEY(-49) THEN
2270 MOUSE STEP 1,0
2280 ELSE
2290 MOUSE STEP 1
2300 ENDIF
2310 ENDIF
2320 MOUSE x%,y%,b%
2330 IF INKEY(-12) THEN
2340 GCOL 0 TINT 0:MOUSE COLOUR 2,0,0,0
2350 ELSE
2360 IF INKEY(-97) THEN
2370 GCOL 63 TINT 192:MOUSE COLOUR 2,255,255,255
2380 ELSE
2390 GCOL %001011 TINT %01000000:MOUSE COLOUR 2,0,255,0
2400 ENDIF
2410 ENDIF
2420 :
2430 IF INKEY(-114) mirror%=FALSE:VDU19,0,24,0,0,0
2440 IF INKEY(-115) mirror%=TRUE:VDU19,0,24,&00,&00,&50
2450 IF(b% AND 4)=4 CIRCLE FILL x%,y%,8:IF mirror% CIRCLE FILLx%,(512-y%)+512,8
2460 IF(b% AND 2)=2 POINT x%,y%:IF mirror% POINT x%,(512-y%)+512
2470 ENDPROC
2480 :
2490 DEF PROCerror
2500 IF ERR<>17 MODE0:PRINT'REPORT$;" at line ";ERL:END
2510 ENDPROC
2520 :
2530 DEF PROCend
2540 SYS"OS_Byte",161,194 TO dummy,dummy,mouse_step%
2550 mouse_step%=mouse_step% AND %111
2560 IF mouse_step%=0 mouse_step%=1
2570 MOUSE STEP mouse_step%
2580 ENDPROC
```

THE FOURTH DIMENSION

Software Catalogue

THE Archimedes Games Specialists



Grievous Bodily 'ARM





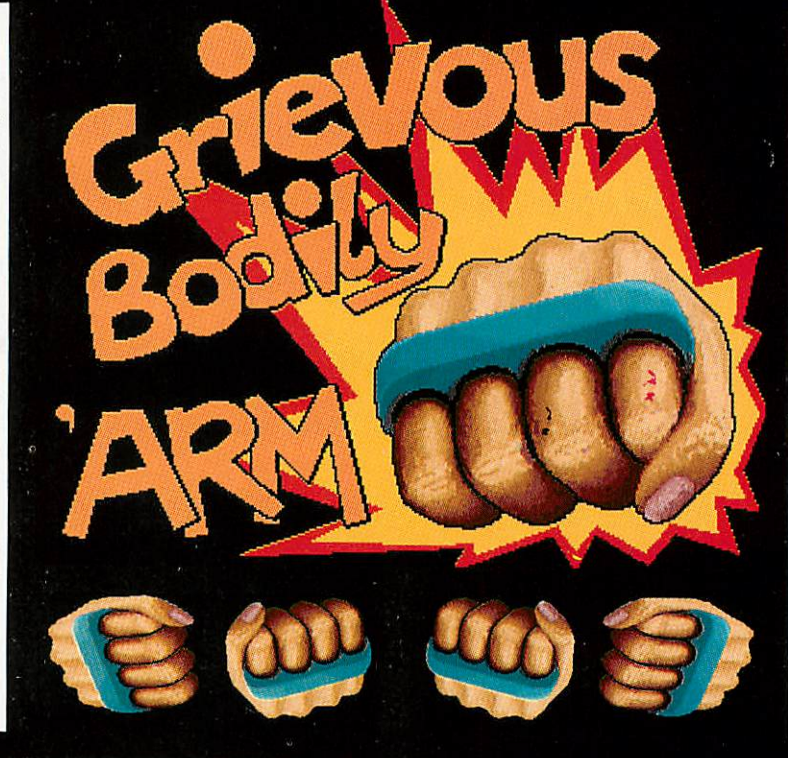
"A Brutal Uninhibited Arcade Beat'em Up!"

The Plot

An evil scientist discovers a cheap and easy way to manufacture vast quantities of illegal narcotics. His intentions - to turn cities full of people into junkies, all dependent on his supplies.

Mass addiction spreads throughout the city within days - like a deadly plague. Gang violence, looting, mugging - people will do anything to get their next fix, your only chance for survival is to get the crazy scientist yourself and make sure he will never be able to make any drugs again.

Punching, kicking - finding weapons along the way, you fight through hordes of junkies in streets, warehouses and sewers until you reach the mad scientist's laboratory where you must 'deal with him for good'.



The Development Team

Comprises a Software Engineer and Graphic Artist who previously worked for years in the American arcade and home console markets, writing ultra-playable games that have sold around 1 million copies worldwide. Now writing for the technically superior Acorn RISC based range of computers.

Techno Stuff

Frame Rate *50 Frames/Second Constant*

Object Code *Handwritten Arm Code and Basic*

Graphics *Over 1.5 Mbyte. High Speed Custom Written Graphics Handlers*

Sound *Digitally Sampled*

Computer *Archimedes with 1 Mbyte or more*

Inputs *Keyboard or Joystick*

BBC A3000 & ARCHIMEDES PRICE £24.95 Release date hopefully late November '91





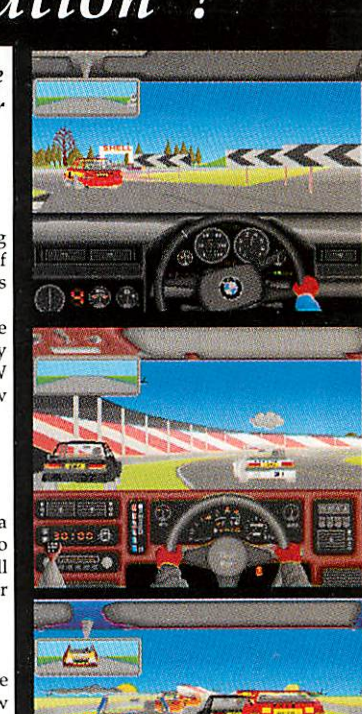
BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES

Saloon Cars





The **Ultimate** Driving "Game-ulation"!



Combining the best features of a fast and furious racing game with the realism of an accurate driving simulator. Work your way up through the leagues, buy extra features and faster cars, to become the Saloon Car Racing Driver of the Year.

Game Plot

You are an amateur racing driver just starting in the field. You race at weekends during the summer, and have a full time job at the office all week* which helps to pay some of the gargantuan bills you incur at weekends! You have recently blown your life savings on an Astra GTE and entered a season of races...

With your Astra you compete in class C against the other Astras and, if you prove yourself worthy by working your way up through the league, you may eventually manage to get sponsorship to race in class B. At this point you will need to buy a BMW M3, built to your exact specifications and the manufacturer's custom price. After a few more seasons you may even reach the exalted heights of a Cosworth Sierra...

*It is beyond the scope of this program to provide a realistic simulation of a full time office job!

Dynamics

The mathematical simulation of the dynamics of a car in motion was set up by a professional physicist. A Classical Newtonian model is used for the transmission and to model the motion of the wheels on the road in both regimes of sliding. The result of all this is a program realistic enough to allow front, rear and four wheel slides, Understeer and Oversteer and of course handbrake turns.

Graphics

The game features 256 colour, mode 13 graphics, designed by a professional artist. The view is a first person, cockpit view from which you can see the road ahead, the rear view mirror and the instruments. The main view features totally customised handwritten ARM code graphics routines which were necessary to maintain the superb frame rate and create a view previously undreamed of. The courses (Silverstone & Brands Hatch) feature bridges, stands, gravel traps, barriers, the pit lane, and even the man with the chequered flag. Of course there are many other features, but we think it's better to save most of them to be a surprise!

Technical Information

Frame Rate	*Up to 25 FPS*
Object Code	*250k of Handwritten Arm Code*
Graphics	*256 colour, mode 13 graphics*
	Handwritten, custom graphics routines
Sound	*Digitally sampled sound effects (Naturally!)*
Computer	*Any Archimedes with 1Mbyte or more*
Inputs	*Mouse, Keyboard or Joystick*
Serial Link	*This option will be supplied on a separate disc*

BBC A3000 & ARCHIMEDES PRICE £24.95

"Saloon Cars" is compatible with the BBC A3000 and ALL Archimedes computers

Reviews

"The graphics are very impressive - 256 colours with the screen updated at a very fast rate. ....technically Saloon Cars is a breathtaking piece of programming and a stunningly accurate simulation." The Micro User, Sep '91.

"...Saloon Cars uses real-time 3D graphics to produce a game that the Amiga can't hope to match (and so far as PCs are concerned you'd probably need either a 33MHz 386 or even a 486!)....The game features 256 colours (mode 13) and absolutely stunning animation. Make no mistake: the speed and smoothness of this game has to be seen to believed. It's the first simulation I've seen on a computer (i.e. outside of mega-expensive arcade machines loaded with custom chips) that actually feels like you are in a car!" Syracuse, Summer '91.

Reviews

"Once you actually start racing for the first time your jaw will need chiselling off the floor - you cannot help but be astounded at the gameplay.....The cars and courses are realistic down to the millimetre (well, nearly!).....To be honest, I would not have imagined that with the amount that goes on, the display would have scrolled so smoothly. You simply need to see it to believe it!" Club A3000, Summer '91.

"For all you driving and/or racing enthusiasts this is the one you've been waiting for. It's also fine for anyone who just wants a good game." Acorn User, Oct '91.

"...if you are looking for a realistic simulation coupled with a fun arcade game and can't afford the running costs (or repairs) of a Cosworth, then Saloon Cars is a must." Micronet, July '91.

BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES

ARCticulate

"The Animated Speech Synthesizer"

This unique and revolutionary speech synthesizer actually has faces that talk to you and to each other. You can choose from 4 main faces and voices - male, female, alien or droid - thereby truly bringing your computer to life!

ARCticulate works in the desktop environment allowing full multi-tasking with word processors etc.. ARCticulate will read any documents that you have written or you can insert jokes, questions etc. etc..
You can alter the pitch, speed, volume and of course voice, during and after any sentence, thus allowing the faces to even talk to each other. The Dictionary supplied is a RISCOS application and is simplicity itself to use. It holds up to 600 words in any file and you can have as many files as you wish - ideal for specialist subjects.
Also included in the package are a selection of jokes, some amusing noises to attach to desktop events, a provisional dictionary file and a superb demonstration program showing you just how articulate Arcticulate is!

FACTFILE

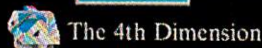
- 4 animated faces able to cover all mouth positions
- 4 meticulously sampled voices which can say absolutely anything you want
- All faces and voices can be installed together
- An individual face and voice can be installed in less than 120K
- Very easy to use dictionary application with up to 600 words per file and limitless files
- Reads text files, word processor documents and can be easily used with your own programs
- Entertaining Joke program, Demo program and Funny Noises program also included

"...ARCticulate produces clearer and more natural speech than any of its rivals. It also has talking heads." Archive, Sep '91.
"...the actual quality of the speech is excellent - I have never heard computerised speech sound so real.... The male and female voices actually sound like real people....ARCticulate is a fun program, and demonstrates high quality speech on the Archimedes." Syracuse, Summer '91.

BBC A3000 & ARCHIMEDES PRICE £24.95
ARCticulate is compatible with ALL Archimedes computers

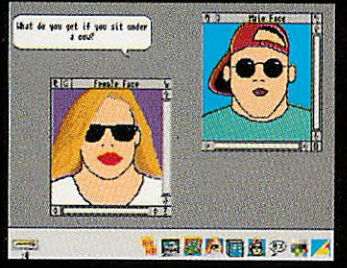
ARCticulate



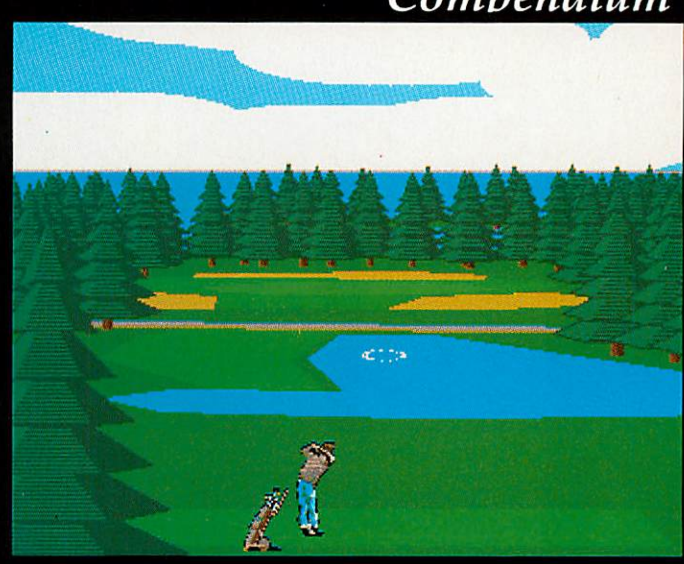








Holed Out Compendium



"An Immensely Playable Golf Game for 1-6 Players"

Includes: The Original Holed Out

This superbly enhanced version really shows the power of the Archimedes at its best. The game is completely mouse driven and features atmospheric digitised sound effects to convince you that you are really playing golf.

- 1 to 6 players. • 2 contrasting 18 hole courses.
- 4 skill levels for beginner to professional. Learn to play without worrying about the wind, bunkers or rough.
- Realistic ball flight paths. • Slice and hook capabilities.
- Variable wind on each hole - every round is unique.
- Full set of 14 clubs with accurately defined performances. You must consider your lie, the distance required, the wind conditions, the height required and the degree to which the ball will bounce and run along the ground.
- Bunkers, trees, water and variable rough.
- Constantly updated full scoreboard. • Matchplay or strokeplay options.

"I play golf and this game is the closest thing to the real game on a computer. The graphics are very good with a large scale golfer complete with bag and trolley (and a good swing!) and the sounds are very realistic." ARCHIVE, June'89.
".....a great game." The Micro User, August, '89.

& The Holed Extra Courses 1 & 2

These feature 4 extra 18 hole courses which have been meticulously created to test your golfing skills to the limit.

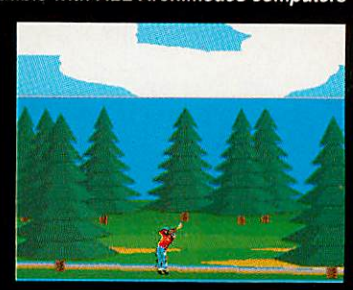
& The Holed Out Designer

Create your own courses with this easy to use yet highly sophisticated hole designer. Its flexibility allows you to define all aspects of the holes from their pars to the size, shape and position of the holes.

"The Holed Out Designer is very easy to use and it makes a perfect complement to the original game." The Micro User, Jan'90.

BBC A3000 & ARCHIMEDES PRICE £24.95
The Holed Out Compendium is compatible with ALL Archimedes computers

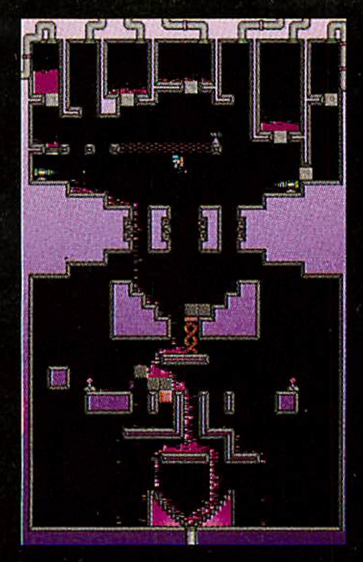




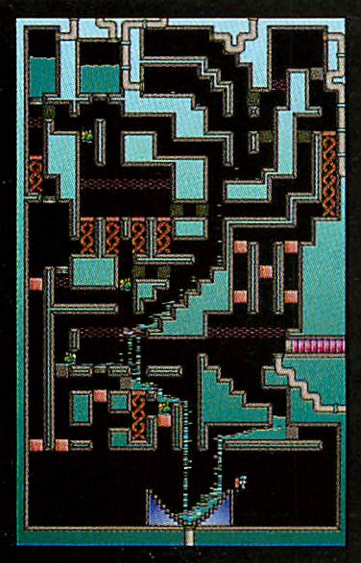




Catalysm







"A Stunningly Original and Watery Game!"

Scenario

Unable to escape the gravitational pull of a truly massive planet, the cosmic exploration ship hurtles ever nearer to the planet's surface. The moment of impact fails to happen. Horrendous creaking sounds, and the faintly audible sound of running water provide sufficient evidence to enable the ship's supervisor to eventually grasp the situation. Submerged beneath a vast and alien ocean, the *Orcna* is gradually disintegrating...

Game

Playing the part of the ship's supervisor, your task is to expel water from different sections of the ship via hydraulic pumps, to give the ship's semi-organic outer shell time to repair itself. The water enters each section through a network of pressure-relieving pipes, and must be directed towards a collecting vessel using several manipulating blocks. This must be accomplished within a time limit, before the pressure becomes too great.

The various sections of the ship contain numerous features to further complicate your task. Pressure valves, dissolving blocks and filters all affect the flow of the water. Additionally, the water's presence has disrupted the ship's computer, which is now intent on terminating your existence using the on board weapons' systems, although it is possible to acquire fire power of your own.

As the *Orcna* is an exploration ship, it contains many strange alien life forms, gathered from distant galaxies. The now chaotic computer has taken upon itself to release these creatures from their confining cells, and the aliens are rampaging freely throughout the ship. Needless to say, several of these species are particularly unpleasant. Your task is to prevent the disaster that would occur were the *Orcna* to succumb to the icy water that is flooding into the ship. Your task is to prevent a cataclysm.

Program

Cataclysm is a stunningly original and unique game. As well as incorporating conventional sprite and pixel plotting techniques, a cellular automata is employed to generate realistic fluid motion. A simple set of rules is applied to each individual droplet of water, with hundreds of droplets forming a dynamic fluid which flows around the various on-screen objects. The water will adopt the shape of any container, and even exhibit tiny air bubbles. Later levels incorporate extended fluid routines to create frothing acid, and coloured liquids that mix on contact. Optimised sprite routines allow the presence of various aliens and over one hundred parabolic particles and bullets, all moving extremely smoothly at a high frame update rate.

Guiding the water through the various features and into the collecting vessel requires logical thought, coupled with arcade reflexes. Cataclysm successfully combines both puzzle solving and shoot'em up elements to create an immensely playable and enjoyable game.

Technical Specifications

50 Hertz cellular automata generates realistic fluid motion.

Over 1000 individual droplets of water on screen simultaneously.

Water, sprites and over a hundred independent particles and bullets updated at 50 frames/second.

256 colour graphics, 320*640 pixel playing area with superbly smooth animation and scrolling.

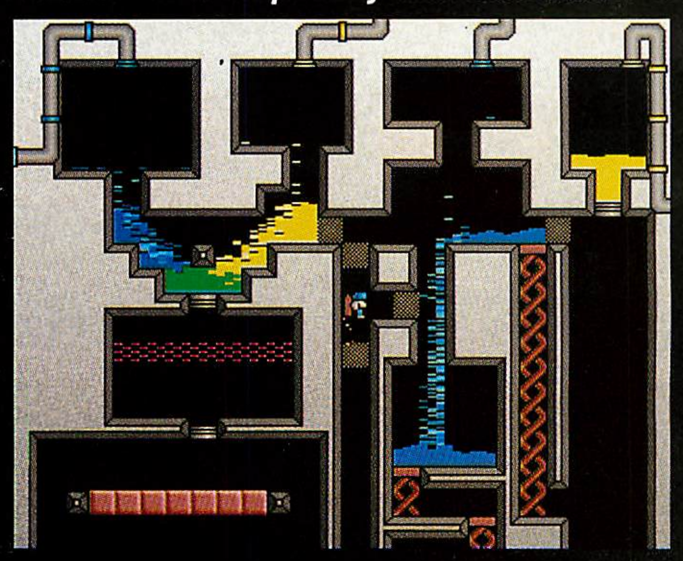
Over 500k of superb sampled music and sound effects.

40 increasingly complex and difficult levels.

Numerous features including valves, dissolving blocks, remote control doors, drip-valves, linear and parabolic guns, increasingly available fire power, various types of aliens, acid, coloured liquids, guided bullets etc...

BBC A3000 & ARCHIMEDES PRICE £24.95 Release date hopefully late November '91





BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES



Boogie Buggy



"The All-Time Classic Car The All-Time Classic Game"

The "E-Type Compendium" includes:

The Original E-Type

Take control of £70,000's worth of gleaming "E-Type" and head off for the drive of a lifetime. Hear the digitised roar of the 5.3 litre 12 cylinder engine as you tear along lanes, roads and motorways at speeds over 150 m.p.h..

"E-Type" takes racing simulations into the world of 32 bit RISC processing to bring you a game of a quality that is not often found even in the arcades.

If you are new to car driving you can take the very easy to drive automatic for a spin but experienced drivers can optimise performance using the faster 5 speed manual.

There are hazards galore in the 5 varied scenarios including other cars, roadworks, pedestrians, trees, rocks, bushes, oil spills and many more.

"On the Archimedes the illusion of speed is terrifyingly real and the way the landscape moves in three-dimensional perspective is a joy - a stunning experience." The Independent, Dec'89.

"This is a superb game....the tracks are fantastic." The Times Dec'89.

"No race game on any other machine looks as good." The Times Educational Supplement Dec'89.

& The E-Type Extra 100 Miles

This consists of 100 extra miles of very hilly and hazardous roads. They will test even the best drivers to the limit.

& The E-Type Designer

This highly advanced but simple to use designer allows you to design your own tracks. It is enormously flexible to produce an endless variety of tracks to challenge you and your friends.

"The perfect complement to E-Type." The Games Machine Feb'90.

"A Totally Original Game with Stunning Animation"

Boogie arrives at Dodge City to find that the Evil Monster Lord has taken control and set about converting power-ore, which is extracted from a mine in the centre of the city, into evil-ore, which he is using to transform all the good in Dodge City into evil. As the Evil Monster Lords' power increases, he proceeds to turn Dodge City into a stronghold for creatures of darkness and other evil monsters, and plots to take control of Bumper World. Boogie has not yet been influenced by the evil-ore and so it is up to him to thwart the Evil Monster Lords' plans.

To do this Boogie must travel across Dodge City counteracting the effect of the evil-ore in each zone by collecting lumps of power-ore, and returning them to the mine. Boogie must also destroy each of the Ore Conversion Plants (O.C.P.'s), before finally meeting the Evil Monster Lord in the Ore Core.

"The first thing you notice about Boogie Buggy is that the graphics are gorgeous. The game uses the border as well as the main playing area by about 40% and the effect is stunning." BBC Acorn User, Sep '91.

"Boogie Buggy sets new heights in presentation, the whole program is a feast for the eyes. Take a look at the lily pond for example, it's breathtakingly good....Boogie Buggy is totally original, packed with action, great sound, catchy music and above all incredible graphics and animation....it's brilliant." Syracuse, Summer '91.

"Coming on three discs, it's certainly a vast game and only just runs on a 1 megabyte machine...Graphics are probably the most pretty and colourful I have seen on an Archimedes, with plenty of plants, flowers and wildlife, all well-drawn in cartoon style artwork...On the whole it's a well thought out and designed game which is addictive too." Micronet, July '91.

BBC A3000 & ARCHIMEDES PRICE £24.95

The E-Type Compendium is compatible with ALL Archimedes computers



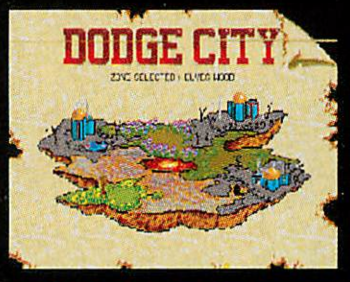






BBC A3000 & ARCHIMEDES PRICE £24.95

Boogie Buggy is compatible with ALL Archimedes computers



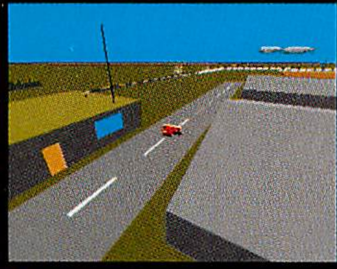


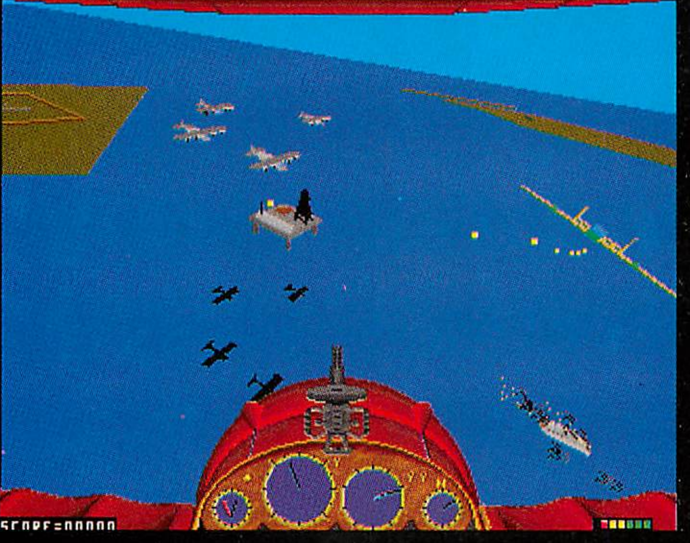




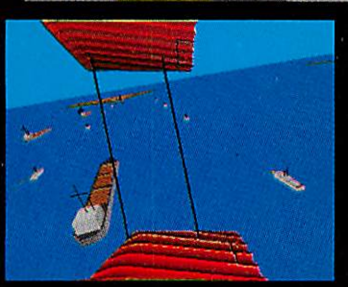
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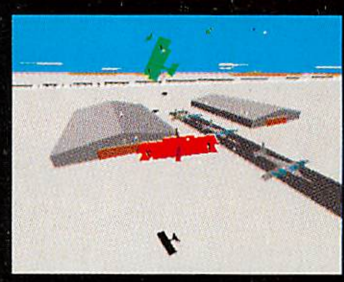
Chocks Away EXTRA MISSIONS











CHOCKS AWAY

This new upgraded Mark II Chocks Away with supersmooth animation really is flight simulation the way you've always wanted it. It has everything for the beginner and the expert:

*Beautiful 256 colour graphics and 'nerve shattering' digitised sound effects

*Easy to fly, yet highly manoeuvrable bi-plane - ideal for all ages/ skill levels

***Revolutionary 2 Player Option** using split screen display. This allows 2 players to each fly their own planes simultaneously in practice, dogfights or missions

*Full joystick, dual joysticks, mouse and keyboard control options

***Amazing "Black Box Flight Recorder"** included so that you can record your own flights and then save and replay them. 90 minutes of totally absorbing pre-recorded training flights are included with the game

*Internal/External views of your plane can be selected from front/ rear/left/right

*Powerful 30mm cannon capable of very rapid fire and long range destruction

*Easy to read instrument panel and simple controls

*3 very varied immense maps to explore - approximately 18000 km² in total

*20 fascinating and varied missions of increasing complexity are included with a promotion system from Cadet right through to Marshal of the RAF

*Superb range of targets/enemies including bombers, triplanes, fighters, tanks, control towers, anti-aircraft guns, HQs, patrol boats...

CHOCKS AWAY EXTRA MISSIONS

This consists of a new manual and a disc containing an additional 26 missions (6 of which are reconnaissance missions). It is loosely based on the original Chocks Away and features an extensive range of extra features and improvements. To run it you will require the MkII version of the original Chocks Away. Extra features include:

*16 new & detailed maps based over land & sea.

*20 enemy planes and 20 enemy targets are included in each mission. Over 1000 extra targets and planes have been carefully defined.

*Considerably improved action on all missions with plenty of targets to shoot at and plenty shooting at you.

*You can view the action from any of the enemy planes or targets and your own control tower at any time even while still controlling your own plane or watching a saved flight. There is a selection of tracking cameras (with adjustable zoom lenses!) around the playing arena. In addition a phantom plane can also be selected to follow the action on any of your black box flight recordings.

*Improved enemy pilots capable of performing loops, rolls, stall turns etc.. All enemy planes are carefully modelled using the same equations controlling your own plane. This ensures both an accurate and fair simulation.

*More enemy planes and targets to shoot including: Three Engine Fighters, Enormous Cargo Planes, Airships, Barrage Balloons, Gun Boats, Oil Tankers, Trains etc..

*Six reconnaissance missions where you are required to take photos of various installations with your new on board camera.

*Improved graphics over the 16 maps including Complex Cities, Houses, Railways, Roads, Rivers, Bridges, Lampposts, Railway Stations, Oil Rigs, Piers, Beachs, etc. to mention but a few. In total over 100 different graphics have been defined.

*Serial Port Link Up option so that you can link up 2 BBC A3000 or Archimedes computers and 2 pilots can fly simultaneously in full screen mode.

*Extensive enemy flak guns and improved enemy plane guns help make the new missions both more interesting and challenging to say the least!

*Improved digitised sound effects plus, of course, all the extensive options which are available with the original Chocks Away.

WIN a Superb ......

"Radio-Controlled Biplane"

Successful completion of all 6 Reconnaissance Missions will allow you to enter this competition

TALLY HO GINGER!









ARCHIMEDES & BBC A3000

All versions are compatible with the BBC A3000 and ALL Archimedes Computers

CHOCKS AWAY (Mark II Version with 1 or {split screen} 2 player options) £24.95

CHOCKS AWAY EXTRA MISSIONS (With 2 player Serial link option) £19.95

CHOCKS AWAY COMPENDIUM (Chocks Away & the Extra Missions) £39.95

CHOCKS AWAY NETWORK (Econet/Midi etc. - Ring for Availability & Price)

Chocks Away Reviews

Chocks Away Mark I Version was awarded GAME OF THE YEAR 1990 by Acorn User, A&B Computing (now Archimedes World), Risc User & Micronet.

"Graphics in the game are superb, smooth and with plenty of ground detail.......this is a really enthralling flight simulator with plenty of variation and features to ensure longevity." Risc User, Dec '90.

"Chocks Away is a delightful game." Archive, Jan '91.

"Chocks Away is a brilliant game." BBC Acorn User, Dec '90.

"....it's a really great game. Playability 10. Value 10." The Micro User, Jan '91.

"(Chocks Away Mark II Version).. The increased speed obviously makes the game more responsive and fun to play, well and truly overtaking Interdictor II as the best Archimedes plane game." New Computer Express, Feb '91.

Extra Missions Reviews

"I reckon Chocks Away is probably still the best game available for the Archimedes/A3000." BBC Acorn User, August '91.

"How do you improve on a game that left me rushing for my Thesaurus to describe it? Well, those guys at 4th Dimension have delivered the goods once again, and have somehow managed to improve on the best flight simulation on our humble Arc." Club A3000, Summer '91.

"Chocks Away remains, above all, fun. It doesn't really sacrifice realism, but it also doesn't make controlling the aircraft so complicated that you haven't got time to enjoy the game.." Syracuse, Summer '91.

"If you haven't yet seen this game, the screenshots in the 4th Dimension's latest adverts don't do the game justice, simply rush out and buy it. Beware though, once you've played it once, you'll never have another early night." Micronet, June '91.

Enter The Realm





"A Superfast Adventure into Arcade Action"



Combining fast arcade quality action and graphics with the element of adventure and surprise. Meet strange characters, build up your weapons and eventually meet evil in mortal combat.

The Background

Travel back to Karidor, a land lost in antiquity. A land of evil, a land of good. A land where almost anything can happen and probably will. A land of magic and a land of beauty. So your quest begins.....

The land of Karidor was a quiet world much like Earth. It had mountains, it had seas. It had forests and it had deserts. Even the people were similar, but one thing was different. This was the fact that magic did exist there.

For many aeons the land was untroubled by any great power until one fateful day where everything changed and evil took control. Evil had always existed of course, but had been in balance with the good of the gods, who were neutral. That day however, the balance was tipped.

It turned out that the ancient prophecies of Karidor had proclaimed this event thousands of years ago. The prophecy stated that evil would overthrow the Realm and only one man, a knight of goodly heart and fearsome ability could reset the balance again. The knight was named Kharas.

Enter the Realm challenges you to lead Kharas in his conquest against evil. On the way, dangers will befall you and surprises will await you...



The Game Design

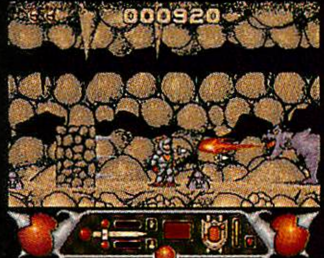
Enter the Realm is the first game to feature true parallax scrolling on the Archimedes and A3000 computers. The whole play area is created from layers which slide over each other creating a true 3 dimensional backdrop upon which the game proceeds.

The game features fast spectacular graphics which are all hand drawn and realistic digitised sound effects and speech which are totally interactive with the action all around you. Everything else in the game will be left as a suprise!

Specifications

Over 2 megs of high quality realistic graphics, all hand drawn.
Over 130k of in-game digitised sound effects and speech.
Over 150k of music by Peter Gillet.
50 frames per second arcade quality scrolling, animation and movement.
6 layer FULL parallax scrolling of play area (forget immitations!).
Massive sprites.
Realistic weather effects and intelligent adversaries.
Control via keyboard or RTFM joystick.

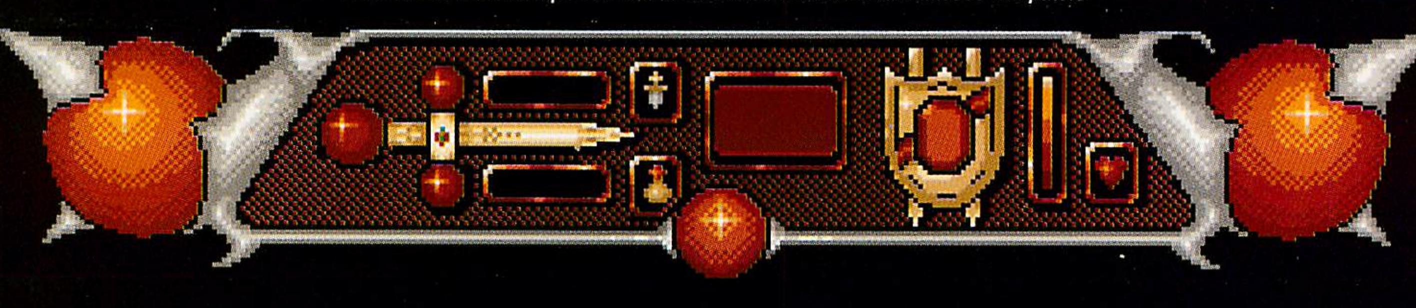






BBC A3000 & ARCHIMEDES PRICE £24.95

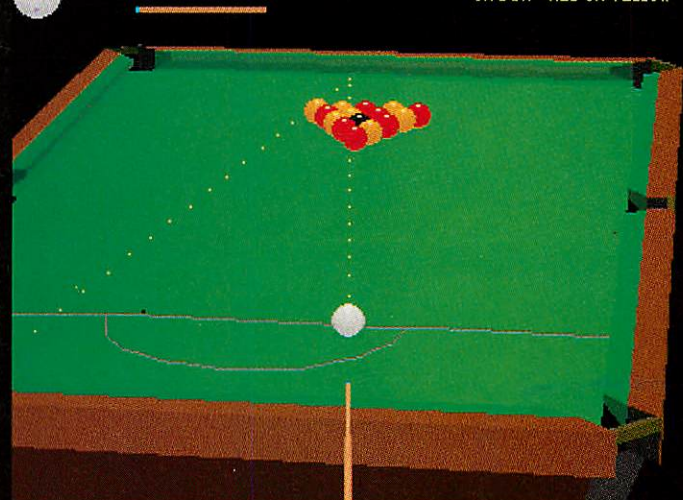
Enter The Realm is compatible with the BBC A3000 and ALL Archimedes computers



BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES / BBC A3000 / ARCHIMEDES

Break 147 & Superpool





"Snooker & Pool Simulator Par Excellence"



'BREAK 147' and 'SUPERPOOL' are game simulations in the true sense of the word. Gone are the power meters and fixed screw and side settings of inferior simulations and in comes a cue driven by reality software.

As in the real thing your grip on the butt of the cue (represented by the mouse), the smoothness and power of your cue action and the way in which you follow through with a shot, are all deciding factors in whether a pot is successful and whether you will retain position for the next ball. The only thing that is missing is the smokey air and a pint of beer on the edge of the table, these you will have to provide for yourself!

In both games you can choose to play on a practice table where anything goes. You can position balls wherever you wish so that you can improve your potting and positional play. You can even undo unsuccessful shots so that you can try them again. When you make that incredibly fine clip into a pocket or miss by the merest fraction, you can watch an action replay of the shot from any angle so that you can either gloat or see where you made that tiny mistake that let you down.

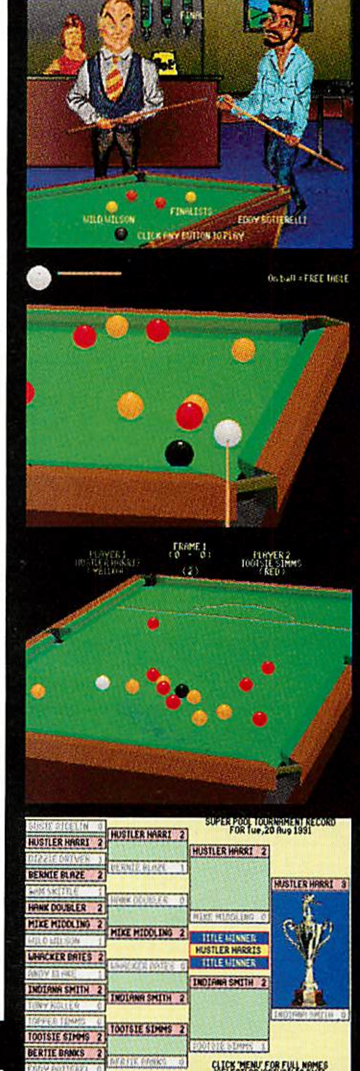
When you feel that you are up to the task you can play a single match against a friend or against one of the sixteen computer players. Should you feel lazy you can just sit and watch whilst two computer players battle it out between themselves. Alternatively you can enter a tournament where you will have to fight your way through the preliminary rounds and on to the coveted Final.

Whilst you are playing a match or in a tournament the game will be overseen by the referee. If in snooker you are 'on' a colour as in real life the referee will indicate the ball to you that he thinks you are going for and it is up to you to let him know if he is wrong. The referee will also call when a free ball is to be given, if there is a touching ball and your score after each successful shot.









SPECIFICATIONS

256 colour MODE 13 graphics optimized for maximum speed
225k of machine code
Over 147k of high quality sampled speech and sound effects
Ball plotting accuracy of +- 0.05 of an inch on a 12 foot table
Cue butt controlled by the Mouse
Bridge hand controlled by Keyboard

BBC A3000 & ARCHIMEDES PRICE £24.95

Break 147 & Superpool" is compatible with the BBC A3000 and ALL Archimedes computers

Reviews

"The graphics are so good that certain photos of the game being played could be mistaken for the real thing. The behaviour of the balls and cue are immaculately simulated." Acorn User, Nov '91.

"All aspects of the game are staggeringly realistic, from walking round the table and eyeing up the next shot, to the trajectories that the balls follow when they move....No longer is taking a shot an unconvincing experience comprising of aiming at the ball, selecting the power level, and hitting a key....The release of Break 147 & Superpool is a giant leap from anything ever seen on our screens, to what is arguably the most realistic snooker simulation ever to be found on a home computer." Club A3000, Autumn '91.

Reviews

"Both Break 147 and Superpool are accurate simulations of the sport. The control method works well and the result is two very enjoyable games in one pack.... whether you are a snooker & pool fan or not Break 147 & Superpool are highly recommended." Archimedes World, Nov '91.

"The most realistic snooker sim I've ever seen." The Micro User, Nov '91.

"If you're a snooker or pool fan who wants a quality simulation for the computer then this is it.... In all, an excellent implementation of the game and I'm sure that due to the realistic 3D movement around the table, practice at Break 147 & Superpool may even improve your real game." Micronet, Sept '91.

The Exotic Adventures of Sylvia Lain



"A Young Woman with 9 Lives and a License to Kill"

The Exotic Adventures of Sylvia Lain features 256 colour mode 13 graphics and supersmooth scrolling using six planes of overlapped parallax with a frame rate of 50 Hertz. The player controls a highly dextrous young woman who can jump, somersault, roll, kick, punch and more. Over 50 frames of animation in each direction are used on Sylvia alone.

Game Outline

Your mission will take you from the latest construction sights of New York to the ancient temples of the Aztecs in South America. After some magic moments you will be whisked on to the Kennedy Space Centre and finally to the B.E.N. Headquarters hidden in a giant oil refinery somewhere in the Middle East. The gameplay is a carefully blended mixture of puzzle solving, arcade adventure, beat'em up and humour.

Mission Brief

The Nobel prize winner, Prof. Doughnut, was abducted yesterday only minutes before he was due to give his historic speech explaining his solution to the world's energy problems. It is believed that the professor has achieved room temperature fusion using the highly unstable elements found only in camel dung. However the exact formula has disappeared with the Prof. We believe that his abductors were none other than B.E.N..

Sources have reported that during the struggle, pages from the scientist's notes were left behind. Your mission is to recover all the scattered pages of the Professor's Notes. Not only will these pages provide clues to the missing formula but the cunning academic has managed to scribble maps on each of the pages giving clues to his next location.

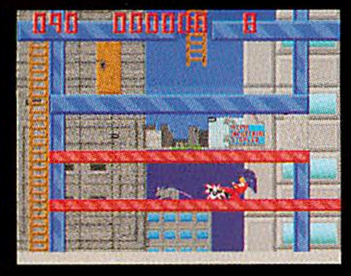
The professor was taken from outside the science faculty in New York. You will therefore be transported there immediately by an Ecologically friendly blimp. You will start your mission by recovering the lost pages at this location. Unfortunately our agents report that B.E.N. already have operatives working there. You are therefore licensed to kill and should use any means necessary, short of damaging the environment, to retrieve the missing papers and hopefully rescue the professor.

BBC A3000 & ARCHIMEDES PRICE £24.95

Release date hopefully mid Nov '91

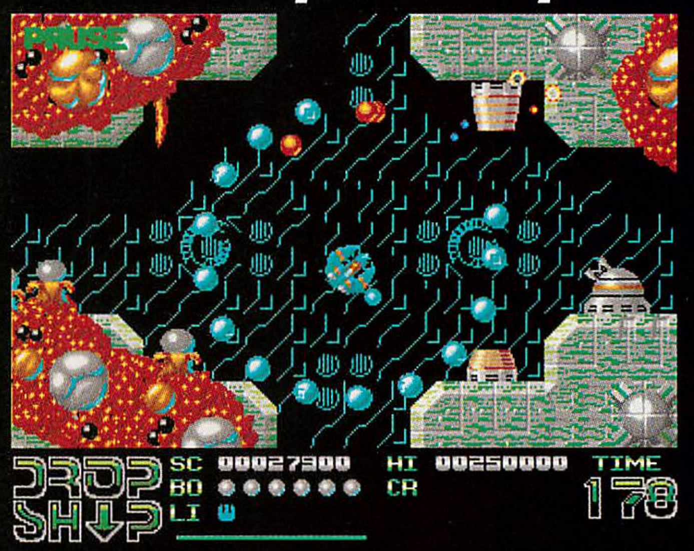








Drop Ship



"Supersmooth Superfast Pure Arcade Action"

Drop Ship is one of the smoothest and fastest arcade games you are likely to see. It features superb 256 colour graphics, 15 increasingly large and diverse stages and an excellent stereo soundtrack.

The Year is 2020....The government proudly announces that the new fast breeder farm on the Mars colony is completely computer managed and totally safe, defended from attack at all times by a fully-automated tactical defence system.

The Year is 2030....Earth receives a transmission from the Mars colony. The radiation seems to have affected the management software at the fast breeder farm. The defence systems have gone haywire and the whole farm is rapidly approaching meltdown. If all the reactors are not shut down the Mars colony will be wiped out.

The defences include gun emplacements, artificial gravity generators, sporers and hoards of deadly aliens. What is needed is a craft which is supremely manoeuvrable, capable of great speed and possessing awesome fire power, and a pilot of extraordinary bravery to fly it. The craft is the Drop Ship. The pilot is you.

Specifications

256 colour mode 13 graphics.
Frame Rate: 50 frames per second.
Maximum objects on screen: 150 per frame.
The ship movement in the game is accurate down to 0.0001 of a pixel.

"A brilliantly addictive game which really makes you want to barricade yourself into a room for a week in order to finish it....The graphics and animation are really superb." BBC Acorn User, Jan '91.

"Compared to both Rotor and Caverns, this game has to be tops. The gameplay is even more difficult than both and the graphics and sound far better." Risc User, Dec' 90.

"Drop Ship is very arcade-like, with excellent graphics, the smoothest movements in town, nice sound effects and a good short demo." Archive, Jan '91.

"To sum up, a game that'll keep you hooked on your machine for many a late night with a cup of Hot Chock." Club A3000, Summer '91.

BBC A3000 & ARCHIMEDES PRICE £19.95

Drop Ship is compatible with ALL Archimedes computers









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SPECIAL OFFER: If you buy The Real McCoys 1 & 2 directly from us you may deduct £10 from the total cost

The Real McCoy



"This 4 Game Collection really is The Real McCoy"

U.I.M. (R.R.P. £29.95)

U.I.M. (Ultra Intelligent Machine) is a futuristic action adventure set in the oceans. It is a huge game featuring solid 3 Dimensional graphics and digitised sound effects. You must travel the oceans in your highly expandable submarine visiting the enumerous ports throughout the ocean networks. As well as gaining combat skills you'll need to learn to trade in commodities, shares and currencies. There are over 250 missions to complete before you will find your goal - the U.I.M. - created to be almost a god.

"U.I.M. is a powerful game that justifies its higher price tag through guaranteed longer life." The Micro User

ARCADE SOCCER (R.R.P. £19.95)

Arcade Soccer really is World Cup Football action at its very best. Using an overhead view to make gameplay as exciting as possible it features everything that you could want in a football game. Corners, throw-ins, goal kicks, dribbling, shooting, passing and much more. The superb graphics and smoothly scrolling pitch are complemented by a multitude of excellent digitised sound effects and music. Furthermore Arcade Soccer is packed with options catering for up to 24 players, weather conditions, friendlies, accurate full World Cup simulation and replays to mention but a few.

"This game is excellent.... I'm not really a soccer buff, but I thoroughly enjoyed this desktop version. The micro-controlled players behave in an amazingly realistic manner." The Micro User

WHITE MAGIC (R.R.P. £19.95)

White Magic is a unique arcade adventure in which you control 4 varied adventurers: a Leprechaun, a Titan, a Warrior and an Enchanter. You can transform between all 4 characters at will and use their much needed special abilities. It features 32 massive action-packed levels filled with aggressive guards and trolls, haunting ghosts and spectres, curious objects to use and find, and much more. White Magic is not a game for the faint-hearted; it is a fast action game which requires fierce hand-to-hand combat and frantic weapon fire.

"Playability is good and I had to tear myself away in order to write this update review." The Micro User

QUAZER (R.R.P. £11.95)

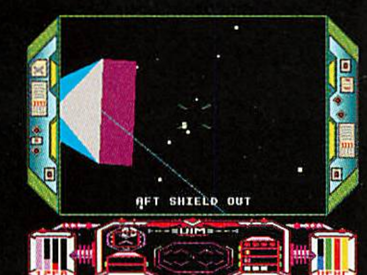
Quazer is a fast action arcade style game with excellent music, sound effects and graphics. It has 11 incredibly detailed and varied vertically scrolling levels filled with the most amazing assortment of baddies you are ever likely to see. Quazer is classic arcade action and will test even the most competent games player to the limit.

"The power of the Archimedes is used to produce some stunning effects..." The Micro User

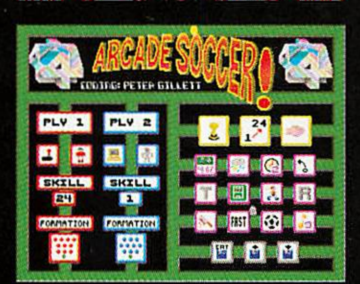
BBC A3000 & ARCHIMEDES PRICE £29.95

The Real McCoy is compatible with ALL Archimedes computers









The Real McCoy 2



"This 4 Game Collection really is The Real McCoy too!"

APOCALYPSE (R.R.P. £29.95)

Apocalypse places you on the surfaces of 9 varied futuristic hostile planets colonised by very varied but always ruthless enemies. In your highly advanced and extremely fast and manoeuvrable craft you must find your way around the increasingly massive planets and systematically annihilate the enemy.

"Simply, this is the best release yet for the Arc by absolutely miles. Stunning graphics, stunning sound and masses of action. Brilliant."....Risc User

HOLED OUT (R.R.P. £19.95)

Whether you're young or old, male or female, beginner or professional Holed Out has been designed especially for you. Features include: 2 contrasting courses, 1 to 6 players, excellent 3D graphics and sound effects, full set of accurately defined clubs, slice/hook capabilities etc. etc..

"...I play golf and this is the nearest thing I've seen to the real game on a computer. The graphics are very good with a large scale golfer complete with bag and trolley (and a good swing!) and the sounds are very realistic."....Archive

"...it is quite a stunning piece of work."....The Micro User

THE OLYMPICS (R.R.P. £19.95)

The Olympics can be played by 1 to 8 players and is comprised of 6 main events: Diving, Shooting, Javelin, Swimming, Canoeing and Pole Vault. It contains a superb piece of music, opening and closing ceremonies and 14 national anthems.

"Compilation packages of sporting events may have been round on other machines for ages but the first one for the Arc is every bit as good .... VERDICT: A Gold Medallist."....A&B Computing (Now Archimedes World)

"Excellent graphics .... Classy presentation .... and plenty of variety .... Should find favour with all members of the family. Definitely recommended.".... Risc User

INERTIA (R.R.P. £19.95)

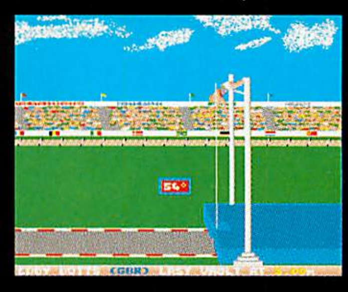
Inertia is a totally original game with beautiful graphics and superb digitised sound effects and music. There are 2 massive and varied landscapes to be explored and many special tiles to be collected. Your craft floats freely around the landscapes and you must exert forces upon it to guide its speed and direction. Full colour 3 dimensional maps of the 2 landscapes can be viewed at any time and are a joy just to wander around.

".... the accompanying music is superb .... Inertia is another reasonably priced game for all ages. Highly recommended."....The Micro User

BBC A3000 & ARCHIMEDES PRICE £29.95

The Real McCoy 2 is compatible with ALL Archimedes computers

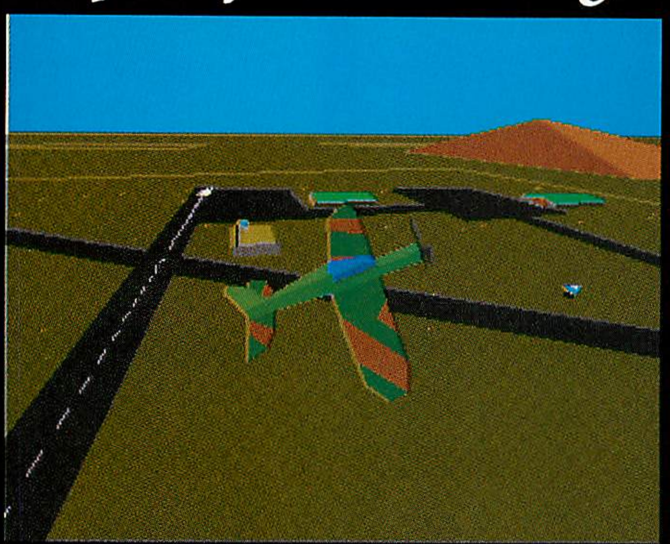








Spitfire Fury



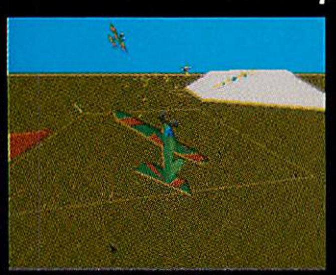
"A Superfast, Action-Packed, Fun & Accurate Simulation"

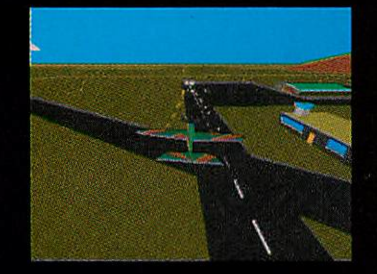
Spitfire Fury is the latest flight simulation game created by Andrew Hutchings (the author of both the Chocks Away games). In this action-filled game you take the controls of the most famous World War II fighter plane and have to tackle a range of challenging missions and tasks. The game has been designed to be an action-packed, superfast and accurate simulation with lots of fun to appeal both to the beginner and the expert.

•Superfast screen update, 12 to 18 frames per second.
•Two player option using split screen or two computer serial link.
•Computer-controlled planes fighting alongside you against the common enemy.
•Lots of varied and **action-filled** missions with over 100 enemy targets to destroy in certain cases. Such as Escorting Bombers, Bombing Raids, Torpedo Attacks on Gun Boats, Solo and Accompanied Missions, etc.. Plus of course a range of practice missions to help you get the hang of landings etc..
•Save and load game options are provided allowing you to save the game onto disk at any point and return to it later.
•A **Super Accurate** model of the plane has been created taking into account wind speed, airspeed over all control surfaces, gravity, drag and lift of each control surface etc.. This makes the plane capable of performing realistic stunts such as spins, which has not yet been seen on ANY previous Archimedes flight simulations.
•Full interaction between all planes, bullets, hills, valleys, buildings etc. This means you can seek cover by flying close to hills, buildings etc. and the enemy planes (and your fellow Spitfires) can make mistakes and shoot each other or crash into obstacles.
•256 colour graphics, digitised sound effects and complex scenery over huge expanses of land including cities, rivers, roads, hills, valleys, railways, boats, etc.
•A huge selection of viewpoints and tracking cameras are provided for you to view the action from. Plus entire flights can be recorded and watched later from any angle.

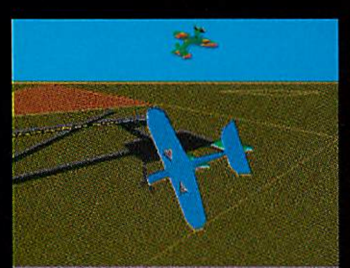
Please note that the screen shots shown are of a very early development version and therefore do not illustrate the graphics which will be included in the final version. Look out for the adverts around the release date for screen shots of the final version.

BBC A3000 & ARCHIMEDES PRICE t.b.a.
Release date hopefully February '92











X-Fire



"Highly Addictive Classic Arcade Action"

X-Fire is an exciting new arcade game which represents a welcome return to traditional arcade values.

Pit your wits and reflexes against hordes of menacing aliens within a high tec battle arena. At your disposal is an awesome array of fire power that is all that stands between you and certain destruction. Both cunning and dexterity will be required to prevail against increasingly sophisticated and dangerous opponents.

Collect bonuses to aid you in your task and augment your ship's capabilities. Regen Bombs, Split Bombs, Shield Reserves and Zaps are just a few of the bonuses available.

With crisp graphics and addictive arcade action, X-Fire combines the best qualities of classic arcade games with the advanced audio and visual capabilities of the Archimedes to create the ultimate high speed shoot'em up.

Specifications

256 colour MODE 13 graphics
Highly optimised custom graphic routines
Up to 200 objects on screen
Over 300k of high quality sampled sound

X-Fire is an essential purchase for any serious game player in search of a lasting challenge.

BBC A3000 & ARCHIMEDES PRICE £24.95
Release date hopefully mid Nov '91









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Pandora's Box





"State of The Art Arcade Adventure"

An intriguing blend of classic puzzles and full-blooded arcade action. Over 200 screens of stunning artwork and game play of the highest quality will appeal to the dedicated adventurer or arcade fanatic.

Prologue

Since ancient times a fastened box has symbolised the danger of our curiosity. This box has been opened and an entire kingdom has been poisoned by the evils unleashed.

The beast that lurked within is free and seeks the souls of men, possessing them and devouring them at will. Feeding upon misery, it profits by treachery and corruption, and in doing so brings the burden of its evils upon the land.

As the finest sorceror in the kingdom you must overcome the black magic and confine the curse once again to the only dungeon strong enough to contain such furious depravity - Pandora's Box.

Quest

The powerful Panmetric graphics system allows you explore complex rooms and stunning landscapes whilst still having plenty in reserve to handle frenzied battles.

At first only armed with a keen wit you must acquire knowledge and magical weapons as the adventure gives way to arcade action. Exploring the length and breadth of the land you could conquer a world of magic or die in obscurity.

Technical Information

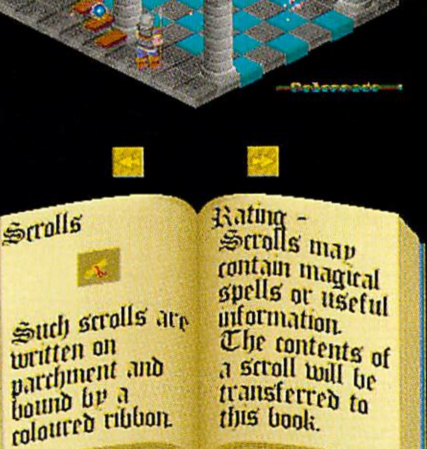
Frame Rate	25 FPS
Object Code	150k of Handwritten Arm Code
Graphics	Over 1000 sprites totalling 3Mb of graphics 256 colour, mode 13 graphics Panmetric graphics system
Sound	Digitally sampled sound effects
Computer	Any Archimedes with 1Mb or more

BBC A3000 & Archimedes Price: £24.95











Roll of Honour

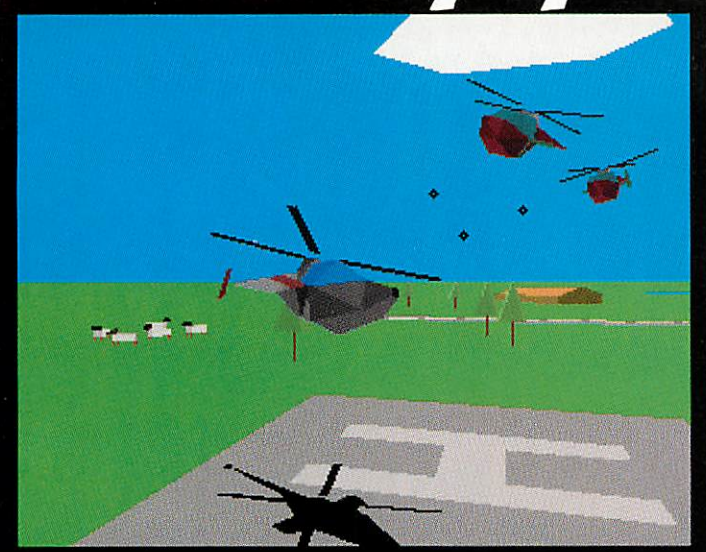
Rank	Name	Score	Done
Mayor	Merlin	2500	25%
Yeoman	Pandora	1500	15%
Beggar	Robert	1000	10%
Tramp	Zippy	500	5%
Leper	Gordon	0	0%

Awarded by

Arthur Rex

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Chopper Force





"Superfast Action-Packed Chopper Sim"

Gameplay

The year is 2023 and advanced weapons' systems such as laser-guided munitions and stealth technology has fallen into the hands of a terrorist organisation.

You pilot a highly advanced helicopter on a number of varied and increasingly challenging missions to attack the terrorists, 'accompanied' by NEXT GENERATION uncannily realistic 3D graphics.

Hardened flight simulator addicts who may no longer find it challenging to pilot a plane will just love learning how to master the controls of the advanced and highly manoeuvrable military helicopter in Chopper Force. And in 2023 there are new super high technology 'smart' weapons to be mastered!

In Chopper Force there are missions that you could never dream of attempting in a plane simulator - such as picking up military hardware with a rope and transporting it to where it is needed as quickly as possible or conveying important intelligence information from the top of a skyscraper in one city to where it is vitally needed in a neighbouring city.

Experience a feeling of total power by hovering a safe distance from a convoy supplying the terrorists and picking them off from a safe distance with your smart missiles. Knock out communication lines going into and out of their HQ to totally cut them off. You will come across their own advanced helicopters, jets, tanks, laser-guided missiles, the dreaded flak, etc..

The final highly tasking mission involves attacking the enemy HQ to totally annihilate the terrorists.

If you can get this far then you are truly worthy of the Chopper Force.

Specifications

Graphics: 256 colour mode 13 graphics
Frame Rate: Up to 25 frames per second
Polygons per frame: Up to 500
Polygons per object: Up to 80

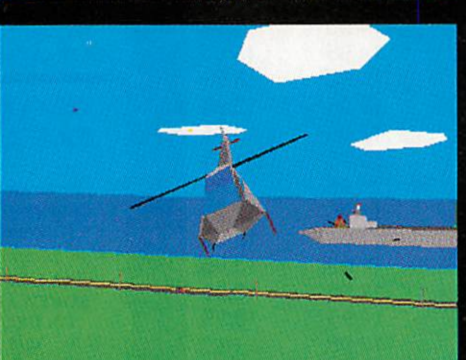
BBC A3000 & ARCHIMEDES PRICE t.b.a. Release date hopefully March '92
The screenshots shown were taken from a young version of Chopper Force













The Fourth Dimension

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Chopper Force (early version)

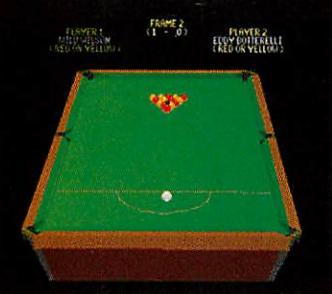


Enter The Realm

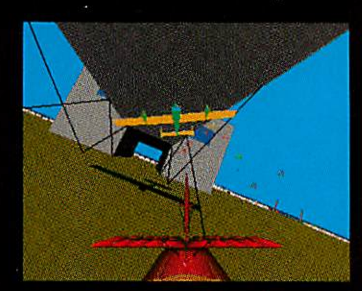

Saloon Cars


The Exotic Adventures of Sylvia Lain


Pandora's Box


Break 147 & Superpool


Grievous Bodily 'ARM


Chocks Away Extra Missions

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The following software is compatible with the BBC A3000 and ALL Archimedes computers

ARCADE GAMES

Grievous Bodily 'ARM	*(Hopefully late Nov.'91)*	24.95
Cataclysm	*(Hopefully late November '91)*	24.95
X-Fire	*(Hopefully mid November '91)*	24.95
Boogie Buggy	*(Arcade Graphics & Gameplay)*	24.95
Nevryon	*(Unbelievable Graphics & Gameplay)*	19.95
Inertia	*(Isometric Arcade Action)*	19.95
Apocalypse	*(3D Mega Game - 9 Planets)*	29.95
Drop Ship	*(Superfast Arcade Action)*	19.95
Arcade Soccer	*(World Cup 1-24 Players)*	19.95
The Olympics	*(6 Varied Events - 1-6 Players)*	19.95
Quazer	*(Furious Arcade Action)*	11.95

EDUCATIONAL SOFTWARE
(from Triple 'R' Education)

Picture Book	19.95
Money Matters	19.95
Data Word	19.95
Target Maths	19.95
Converta-Key	19.95

3D SIMULATIONS/GAMES

Chopper Force	*(Hopefully March '92)*	t.b.a.
Spitfire Fury	*(Hopefully February '92)*	t.b.a.
Saloon Cars	*(The Ultimate Driving"Game-ulation"!)*	24.95
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Chocks Away Extra Missions	*(26 Extra Missions plus some Superb Enhancements)*	19.95
Chocks Away Compendium	*(Chocks Away + Chocks Away Extra Missions)*	39.95
Powerband	*(Superfast Formula 1 Grand Prix)*	24.95
E-Type Compendium	*(3D Classic Car Racing) (E-Type + Extra 100 Miles + Designer)*	24.95
Holed Out Compendium	*(3D Golf 1-6 players) (Holed Out + Extra Courses Vol.s 1 & 2 + Designer)*	24.95

GRAPHIC ADVENTURE

The Wimp Game	*(Unique Graphic Adventure)*	19.95

ARCADE ADVENTURES

The Exotic Adventures of Sylvia Lain	*(Release date hopefully mid November '91)*	24.95
Pandora's Box	*(Stunning Graphics & Gameplay)*	24.95
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Man-At-Arms	*(Medieval Arcade Adventure)*	19.95
U.I.M.	*(Massive 3D Action Adventure)*	29.95
White Magic	*(Magical Arcade Adventure)*	19.95
White Magic 2 + Designer		19.95

COMPILATIONS

The Real McCoy	*(4 Game Compilation) (U.I.M., Arcade Soccer, White Magic & Quazer)*	29.95
The Real McCoy 2	*(4 Game Compilation) (Apocalypse, Holed Out, The Olympics & Inertia)*	29.95

SPEECH & ART SOFTWARE

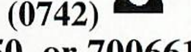
ARCtist	*(Easy to use Professional Art Package)*	24.95
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Title	BBC B & Electron Cassette	BBC B & Master 5¼" Disc	Master Compact 3½" Disc
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Picture Book *(Educational Software)*	12.95	14.95	15.95
Money Matters *(Educational Software)*	12.95	14.95	15.95
Data Word *(Educational Software)*	12.95	14.95	15.95
Target Maths *(Educational Software)*	12.95	14.95	15.95
Converta-Key *(Educational Software)*	12.95	14.95	15.95
E-Type *(3D Classic Car Racing)*	9.95	14.95	15.95
Nevryon *(Pure Arcade Action)*	---	14.95	15.95
Inertia *(Isometric Arcade Action)*	9.95	12.95	13.95
U.I.M. *(Massive 3D Action Adventure)*	---	19.95	21.95
Holed Out *(3D Golf for 1 to 4 Players)*	12.95	14.95	15.95
Holed Out Extra Courses Vol.1	9.95	11.95	12.95
Holed Out Extra Courses Vol.2	9.95	11.95	12.95
Arcade Soccer *(Fast Action - 1 or 2 Players)*	9.95	12.95	13.95
White Magic *(Magical Arcade Adventure)*	9.95	12.95	13.95
White Magic 2 + Designer	9.95	12.95	13.95
The Art Studio *(Easy to Use Art Package)*	9.95	12.95	---

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SUMMING UP

Pipedream 4 is the latest version of the popular spreadsheet. But is it the final word? **IAN BURLEY** finds out

Colton Software's original *Pipedream* package was designed to be a veritable jack of all trades package for the BBC A3000/Acrhimedes, offering a spreadsheet, plus wordprocessor and database capabilities. The latest incarnation of this package – *Pipedream 4* – features a number of enhancements, including an improved Risc OS interface and an impressive graphs and charts system.

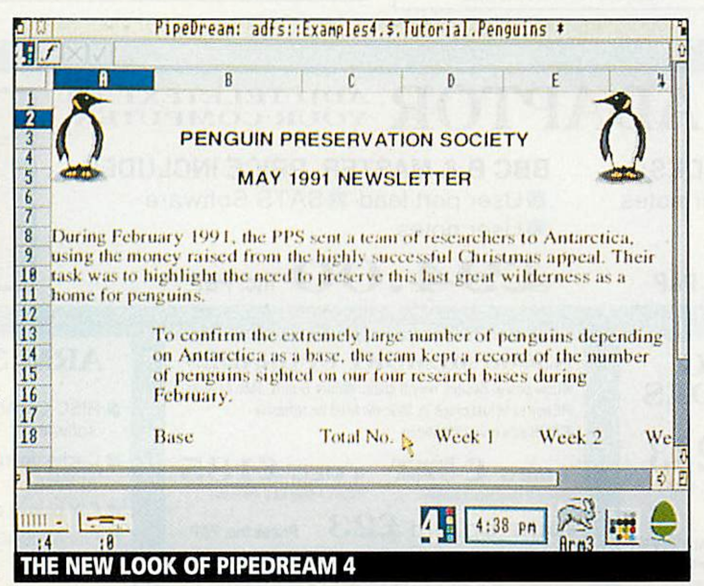
I have been a *Pipedream* user since before the Archimedes was unveiled – you might remember its predecessor, *View Professional* for the BBC Micro. *Pipedream* arrived when *View Professional* was enhanced and recoded in the C language after the Archimedes was launched in 1987. That was in pre-Risc OS days and the original version of the package was strictly a character-based application running under the old Arthur operating system. *Pipedream 3* was launched with the advent of the Risc OS desktop system we all know and use today.

WHAT IS IT?

Pipedream is primarily a comprehensive spreadsheet program which gets by as a useful wordprocessor, spell-checker and a simple database manager which is also capable of mail merge and handling illustrations. I have personally used it daily for years as a wordprocessor and I know others who swear by its database facilities.

This latest revision of *Pipedream* (version 4.10) doesn't offer what I would call fundamental improvements for wordprocessor or database users. For example, I was disappointed to find that text highlighting in wordprocessor mode is still restricted to whole lines, which can make editing fiddly. On the other hand, text scrolls more easily and predictably, while the cursor seems better controlled. Wordprocessor template files make life easier too.

Colton Software is reasonably claiming that *Pipedream* can be used as a database, but it is very much a compromise with the spreadsheet and is tricky for all but the simplest of operations. However, the general versatility of the package tends to excuse its idiosyncrasies. To be able to create a document containing parts of a database and spreadsheet will still be a welcome novelty to many users.



THE NEW LOOK OF PIPEDREAM 4

COMPARISONS

	PIPEDREAM 3	PIPEDREAM 4	SCHEMA
VERSIONS TESTED	3.14R	4.10	1.18
Price (ex VAT)	£147	£196	£114
Initial memory used	512K	832K	640K
2000 value CSV load	12sec	9sec	80sec
Memory used by above	608K	960K	800K
Liardet recalculate	7sec	9sec	23sec

PICK UP A PENGUIN

Where *Pipedream 4* clearly scores is in its brilliant new graphs and charts section. Previously, *Pipedream* users had to buy a separate graphs and charts utility to transform their spreadsheets into good graphical presentations.

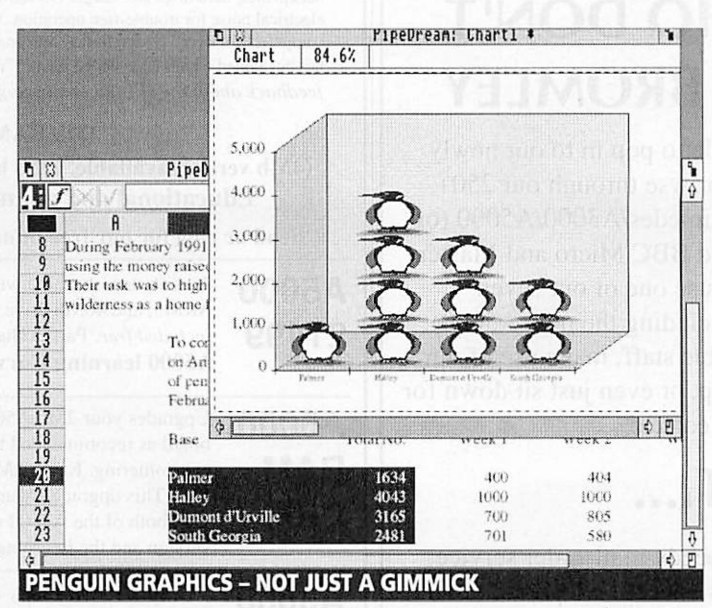
Pipedream 4's charts look set to change all that. Boring old solid bar charts can now be spruced up by graphic objects imported from *Draw*. Colton decided that a penguin figure would capture the imagination, hence the term Penguin Graphics. Your graphs can have lots of little penguins piled on top of each other, or a single penguin stretched out or compressed to fit the value it represents. But you are not restricted to penguins, the template can be replaced by any *Draw* object you choose.

You can have different graphics objects (breeds of penguins, perhaps) representing different values in the same graph. Graphics can also be pasted on to graph backgrounds. The constituent objects of a graph, which can be exported as a *Draw* file, are easily manipulated for refining the layout. Naturally, graphs are hot-linked to the spreadsheet data they are referenced to – change a sheet value and the graph is instantly updated.

WHAT'S NEW

Overall, *Pipedream 4* offers the four basic types of graphs: pie, bar, line and scatter, including 3D options. Colton is content to leave it at that for the moment, since relatively few want polar co-ordinates or fancy scientific graphs – and if they did, they would probably be more likely to invest in something like *Graphbox*. However, of the graph types you get with *Pipedream 4*, they are the best I have seen on the Archimedes so far – and that is even before the penguins come out to play.

As well as the added graph capabilities there are a number of more subtle changes to the package. *Pipedream*'s spread-



PENGUIN GRAPHICS – NOT JUST A GIMMICK

SECOND OPINION

I immediately thought Pipedream 4 was easier and more aesthetic to use than before. The windowed display is clearer with slot information easier to view. Function key definitions have been simplified too, with more control gained by using the mouse.

For example, there is the ease with which columns can be widened and shortened just by dragging the mouse over them. However, text editing still requires you to mark whole slots rather than individual characters which can still lead to some confusion until you get used to it. The charts and graphs facilities are a welcome addition which makes impressive outputs very easy to obtain without the fuss of exporting data to secondary applications. Graphical output can then be re-merged with the text to produce professional looking documents very simply.

On the whole Pipedream 4 seems to have had a major overhaul from previous versions, with many jagged edges smoothed out to provide a very slick and powerful desktop application.

Paul Vigay, BAU columnist

sheet functions have been improved. There is now no option for recalculating by row or column – natural fashion recalculation is fixed instead, and the user is encouraged to explore the custom function facility more.

Some previous options, like global iteration and file linking, have been removed. Colton's argument here is that use of custom functions is potentially more elegant and powerful. Strings must now be enclosed by double inverted commas (such as "string") – this mainly affects database use as formerly condition arguments were strings. As a result, *Pipedream 4* is now more versatile in its handling of string types.

Pipedream's And, If and Or key words are now more efficiently evaluated for faster calculation. There are some new date and time functions, including one to return to today's date.

The above is just a sample of a myriad of relatively small changes made. Inevitably, some users will find certain problems when loading very complex *Pipedream 3* sheets into the new package, although I managed to avoid any problems with my own library of sheets. A useful set of compatibility notes is provided for reference.

IN USE

Immediate changes are noticeable in the new edit window. It looks much smarter, column widths can be altered instantly using the mouse and a formula icon gives convenient pointer access to spreadsheet function keywords. Next to this are the tick and cross buttons used in formula editing. At the corner, where the column and row headings meet, is a rectangle which darkens when a block has been marked. This also acts as a counter during calculations – a useful activity indicator.

On the icon bar you now get a current documents list option, a document template load option and a set of choices or preferences for setting things like menu verbosity, spell-check defaults, displayed colours and so on.

Pipedream 4 is claimed to be the fastest spreadsheet on the Archimedes. With the standard Liardet benchmark, it proves to be a little over twice as fast as its nearest rival, *Schema* from Clares Micro Supplies. However, we did manage to produce some dummy test sheets which proved faster on *Schema*, although exactly *why* this was the case remains a mystery.

Pipedream 4 will try and do as much as possible in the background in order to prevent the user from being locked out of the computer. This is a useful point and unlike many other Risc OS packages, including *Schema*, when you are faced with an hour-glass, a percentage-to-finish indicator is provided as well.

THE SPEED TEST

Oddly enough, *Pipedream 4* proved slightly slower than *Pipedream 3* in the Liardet test. *Pipedream 4* is faster in other areas, however. CSV (comma separated value) files are loaded by *Pipedream* almost 10 times faster than with *Schema* and 25 percent quicker than with *Pipedream 3*. If you need to regularly import large chunks of CSV data into your spreadsheets, CSV import speed will be an important factor.

I must mention that much difficulty was encountered in moving test spreadsheets between *Schema* and *Pipedream*. Neither have facilities to import files from the other's format. Colton insists that there isn't any demand for a *Schema* loader, whereas Clares is promising a *Pipedream* loader in its long-promised version 2.0 of *Schema*.

Both have utilities to swap *Lotus 1-2-3* files, but after lots of head scratching, the only reliable way we found of transferring files using this method was from *Schema* to *Pipedream*. We didn't have much luck when we tried to make the *Schema/Lotus 1-2-3* translator work properly going in the opposite direction.

CONCLUSION

Pipedream 4 is a welcome successor to *Pipedream 3*. The graphs and charts section, penguins and all, is excellent. With the exception of windows flickering occasionally, the new Risc OS interface is much smoother and the background operation works better than before. These, plus auto column widths, are very welcome features.

However, I am still very frustrated by the continuing standstill in wordprocessor editing enhancements and Colton has advised me not to hold my breath on that point. Whereas *Pipedream 3* would just about shoe-horn into a 1Mb A3000/Archimedes, this is not the case with *Pipedream 4*. You will need 2Mb to run the new version .

Colton Software claims that the new package is the best spreadsheet for the Archimedes. I would certainly recommend it over the existing version of *Schema*, but then I also await *Schema 2* with interest. *Schema*'s impressive Basic-like programming language is potentially more powerful than *Pipedream*'s custom functions and, if you need complex programmability, you may need to study the *Pipedream 4* specifications more closely.

On the negative side, while still good value, *Pipedream* is not as affordable as it used to be and there is a lack of much-needed improvements to the wordprocessor. On the plus side, *Pipedream 4* offers improved refinement, superb graphs and CSV speed.

For the vast majority of users, *Pipedream 4* is more simple and versatile than the competition and remains the best option to go for.

PRODUCT DETAILS

Product: Pipedream 4
Supplier: Colton Software, 2 signet Court, Swanns Road, Cambridge CB5 8LA
Tel: (0223) 311881
Price: £196 plus VAT (Pipedream 3 users can upgrade for £80 plus VAT).
Machines: BBC A3000 and Archimedes with 2Mb of Ram

TAKE AIM

Image processing does not have to be expensive, as **DAVID KNELL** explains

When it comes to image processing, *AIM (Another Image Manager)*, is hard to beat for value. It costs only £1 in its most basic form – yet it seems to provide image processing under Risc OS that is comparable with systems that cost hundreds of pounds to run on other, extremely expensive workstations.

AIM is a sophisticated Public Domain (PD) suite of programs which has been ported to the Archimedes. The Risc processor in the Arc is ideally suited to image processing and the only limitation is the display hardware – ideally, the machine would be able to display 256 levels of grey at once, instead of the 16 available. However, there are ways around this.

ON OFFER

So what facilities does *AIM* provide? Well, just about everything you need for processing images. *AIM* comes with a set of macro files (programs) which demonstrate many possible uses, some of which we have shown in the examples here. One of the best examples, provided with the suite, can take a circuit diagram and identify which components are resistors, capacitors, and so on. Image processing also has many commercial uses, for instance the Milk Marketing Board use it to quantify the number of bacteria found in a milk sample.

AIM allows processing on four 256 x 256 images in 256 levels of grey – this is more than adequate for most image processing tasks. However, it can only cope with a scan of about 0.5in square at 400 dpi (dots per inch). The resolution is perfectly adequate for images captured from video.

In order to display 256-level greyscale images on a machine which can only display eight levels at a time (using the standard desktop palette) *AIM* uses a Sigma-Delta, or dithering technique, where errors are spread out so that the display appears to show 256 distinct levels of grey. The images are held internally to 256 levels, and all image processing operations happen at this level – the dithering only occurs when the image is displayed.

AIM under Risc OS performs very well compared to similar software on other machines. One published benchmark shows an A5000, running *AIM*, performing at three times the speed of an Apple MacIIfx, which costs considerably more than the A5000. To run, the package requires a machine with 2MB of memory, and preferably a multisync monitor.

CONCLUSION

AIM is, quite simply, good fun. Reading up on the subject will definitely increase your enjoyment – we published a *BAU* series on image programming in 1990.

Images can be scanned or grabbed from a digitiser (*AIM* provides built-in support for the Watford one.) This package is also an excellent platform for more serious image processing work and can be used for a large number of everyday image processing tasks on the Arc. And, at the price, how can you resist enhancing your image?

PRODUCT DETAILS

The AIM software is Public Domain and can be obtained by sending a £1 coin, a formatted disc and an SAE to: AIM Offer, 8 Coton Road, Grantchester, Cambridge CB3 9NH. AIM is also distributed by Lingenuity and costs £25 plus VAT, including the cost of a printed manual, which I recommend. Lingenuity can be contacted on (0986) 85476.

ALTERING IMAGES

The source picture on the left looks dim and blurred, as if it were a photograph taken through fog. The first operation on the image was histogram equalisation, which involves spreading out the range of grey levels to cover the full range available. This has the effect of increasing the contrast of the image. The second operation was to apply a simple sharpening filter, which reverses the original blurring.



BEFORE: Original image, slightly blurred, low contrast



AFTER: After histogram equalisation and sharpening

Below is an example of noise removal from an image. The source image (left) has a large amount of 'salt-and-pepper' noise (black and white specks) which is removed using a median filter.

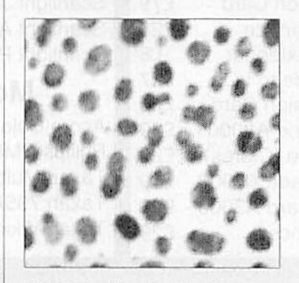


BEFORE: Image with large amount of noise

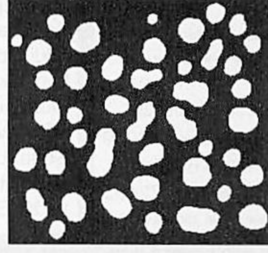


AFTER: Effect of using a median filter on the image

Images can be turned into useful information. The original image of these cells is thresholded to separate foreground from background, and each cell is then inspected. The results show where the cell is in the image, its size, and how close to a circle it is (the nearer the 'p2len' measure is to 1, the closer the shape is to a circle).



BEFORE: Thresholded image, showing how the cells have been picked out



AFTER: Measurements are made of the individual cells in the image

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Parameters

Portrait	Landscape	User scale:	100%
Print unscaled		User width:	100mm
Print scaled		User height:	100mm
Print user size		Paper overlap:	20mm
Print preset page		Print margin:	20mm
A0 A1 A2		Print xoffset:	0mm
A3 A4 A5		Print yoffset:	0mm
Prompt between pages		OK	CANCEL

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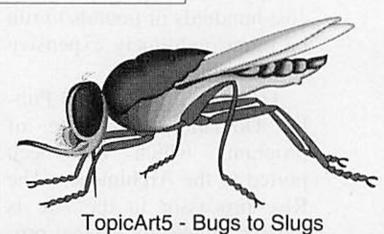

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Archimedes, A3000, A5000 Software

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MAR 92

The smArt Suite

All 4Mation packages for the Archimedes carry a FREE SITE LICENCE.

SmArt is a Linked Graphics System. When picture files are loaded into smArt, different parts of the picture can be changed by making selections from a menu. The graphics components are automatically scaled so that the parts always fit. Pictures may be saved as Draw files or transferred to DTP programs or any other applications which can handle Draw files.

The smArt package comes with over two dozen files on subjects ranging from shops to cars, and churches to British Isles maps. Available as separate products are discs of smArt files on specific themes such as Leisure, Heraldry, Faces, Fashion, Homes, Trees & Gardens, and Dinosaurs.

smArt £55 (NZ$ 198)   smArt discs £16 (NZ$ 59)



For those wishing to create their own smArt files, smArtFiler is an application which compiles smArt files from your source Draw files. Full instructions are provided along with lots of examples. Individual components may be scaled, rotated, and placed in front of or behind other components. Menu entries may be specified.

If it can be drawn it can be a smArt file.

smArtFiler £35 (NZ$ 129)



Chameleon is an ideal companion to smArt, and a must for anyone who needs to make quick and easy colour changes to Draw files. As well as palettes for 16 and 256 colour modes, there are options for 256 shades of grey and a RGB colour cube which provides thousands of colours. Colours may be selected from other Draw files so can be copied from one picture to another. Colours may also be changed in HSV values; Hue, Saturation and Value. Edited files may be saved as normal Draw files or as colour separations. A clever Undo and Redo facility allows virtually any number of colour changes to be cancelled and then reinstated. Zoom and Magnification facilities allow accurate editing of small areas.

Chameleon £25 (NZ$ 95)

FREE DEMO DISC

Send us a blank disc to receive a demo copy of smArt and Chameleon. Only the save facility is missing. Poster demo also available.

Poster	£89	NZ$367.50
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Jigsaw	£29	NZ$120.00
Jiglet	£29	NZ$120.00
DTP Seeds*	£ 8.45	NZ$ 35.00

* (book - no VAT)

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ILLUSTRATION BY GEORGE SNOW

A new package allows you to design your own adventure games. **SAM GREENHILL** takes the controls

FLIGHTS OF FANCY

If you are a fan of either the *Interdictor* or *MiG-29* flight simulators for the Archimedes, then you'll be interested to know that Simis – the company responsible for both simulations – has finally made it possible for you to construct a customised flight simulator of your own. *Flight Simulator Toolkit* (*FST*) basically puts you in control. You decide on the scenario, the rules of the game and the mission to be accomplished.

A LOOK INSIDE

FST includes two discs plus a hefty manual in a laminated box, with four main tools for creating a simulator on one disc and example games on the other. The four tools are: a Shape editor, which allows you to design three dimensional objects; a Cockpit Designer, enabling general layout of instruments; an Aircraft Model editor, to define how the plane should behave according to its wingspan, weight, fuel capacity, general physique, and so on; and a World editor which combines the lot, defines the playing area and sorts out your enemy from your elbow.

The purpose of Shape is to create 3D objects within the simulation. The runway is an example of a fairly flat object created in Shape, whereas the aircraft are solid objects that can be viewed from any angle.

SHAPE CREATION

Objects are created in Shape by placing points on a grid and then defining polygons by clicking on two or more points in a clockwise order. You can only ever work in two of the three axes by masking out the third. But by calling up view windows it is possible to see what the shape looks like from different angles – the software usefully highlights the polygon being worked on.

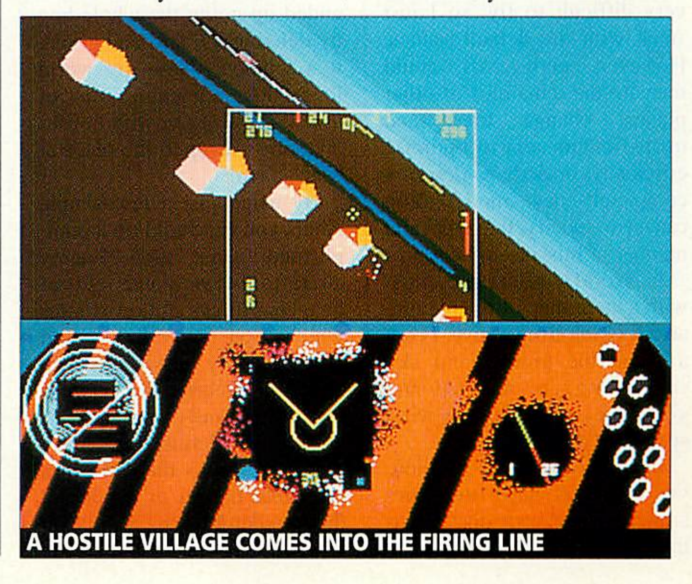
But it really is *hard.* I thought I'd start by creating a nice simple cube. Big mistake! Cubes look the same from each viewpoint, so it is best to start with something like a cuboid or even a simple house (a cuboid with a roof). However, this took me more than two hours to master.

I discovered that it is easier to set up the working window on the left of the screen, the toolbox at top right and a 3D wireframe image in a window bottom right, with the 3D image rotated 55 degrees in the X axis and 45 degrees in the Y axis. This helped me to see what was going on.

Even though you can only deal with points and polygons in just two axes, you still have the problem of different layers. If you view a normal box from precisely above, its lid and base will appear in the same place and can be difficult to distinguish without the use of the 3D window. To overcome this problem you use the up and down arrows to step through the layers of an object – two in the case of the box (lid and base).

Colouring a polygon is very straightforward and standard operations, such as delete and move, are not badly implemented. In my review version of *FST* there is a lack of any copy feature so that, once I'd created a window for my house and wanted to duplicate it a few times, I found that I couldn't. The final version will incorporate copy but mine doesn't – so my house ended up looking like an asylum.

It is not possible to design a cuboid by creating one side and then extruding a copy of itself out to form a solid. Come to think of it, you don't really drag anything anywhere in Shape: moving, rescaling and rotating objects is all done by typing in numbers, but unfortunately the mouse is not



A HOSTILE VILLAGE COMES INTO THE FIRING LINE

used to do this interactively. Another slight oddity is the way in which polygons are created. Because only one side of a polygon is drawn by the simulator it is necessary to create some polygons in a clockwise fashion and others anti-clockwise, so as to tell Shape which side to plot. Luckily a menu option called Flip is provided to easily swap the direction if you find out you've drawn it wrongly.

DESIGNER TOOLS

The Cockpit Designer is a refreshingly easy utility. All you have to do is drag the various dials, warning lights and other bits and bobs from one window to the cockpit display where they can be shunted around to wherever you think they look best.

The snag is the pictorial design of the cockpit itself. Sensibly, this is left to you to design using an art package or just *Paint*, but you still need to make sure that you leave the right sized gaps for the simulator to fit things like the radar and altimeter in. The head-up-display is also defined.

Using the Model tool you can tweak the aerodynamics of your aircraft, alter the size of the engine and general modify the way in which it flies. The aircraft in one of the example games on the disc is a biplane with a propeller at the front. The weight, wing specification and engine power are all completely different to that of the other example plane, which is a Tornado.

Whenever I changed one of the factors I found the plane very difficult to fly, so I just stuck with the default values. However, enthusiasts could recreate the dynamics of other planes, change tried and trusted parameters to optimise efficiency, or perhaps design a completely new model. You can also specify the type and number of missiles to be used.

In World you are presented with a large map of the playing area looking from above. From a menu the ground and sky colours may be selected and you can even specify the wind speed and direction.

In good Risc OS fashion, you can drag shape files from a directory on your disc, on to the world grid in the places you want them to appear. Once a shape exists on the map you can move, rotate or elevate it up in the sky and tell the simulator what the shape is to be.

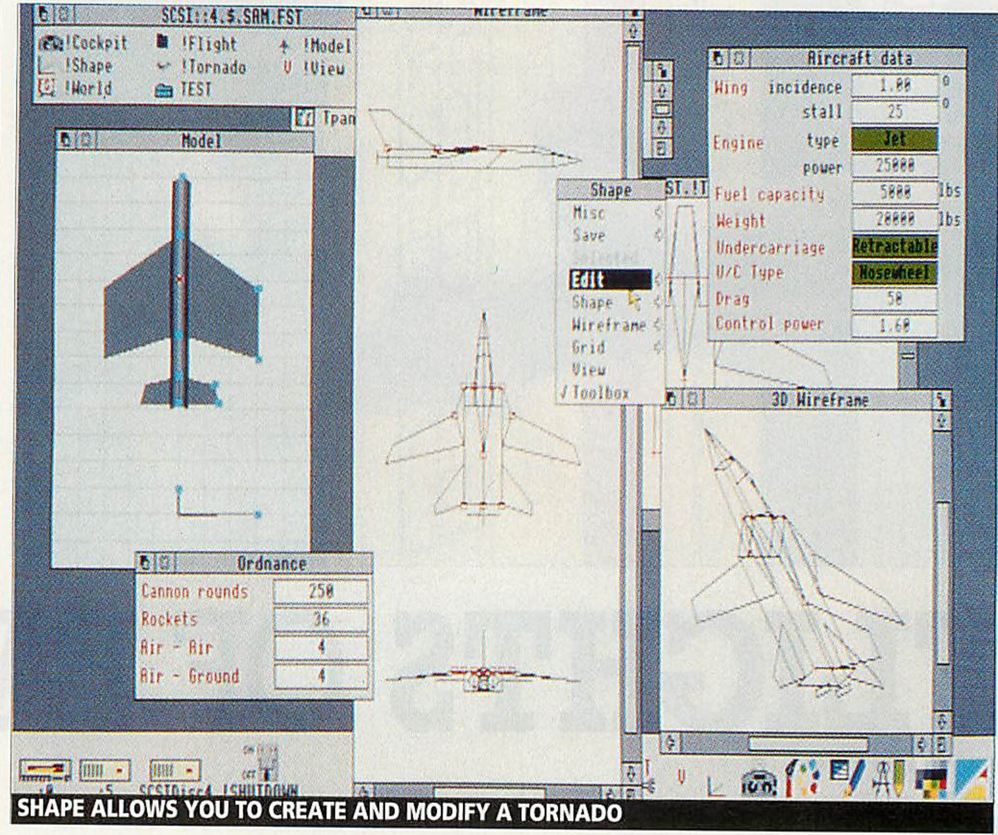
By calling the shape a depot, other shapes called trucks will drive in and out of it. By classing it as a Sam site, it will begin to fire if you venture near and, of course, one shape needs to be labelled as the plane in which you fly.

I decided to use the design of a house with one window to be the shape allocated to the aircraft model. I tried to design a flying pig but, since my pig looked more like a house I ended up going the whole hog by deleting its 'tail' and giving it a window. Now my world looks like something out of *The Wizard of Oz*, with houses zooming all round the place at Mach Two!

By using just a few simple labels you can build up a complicated game plot. Enemy aircraft always come out of hangers, trucks follow routes which you can define and depots supply missiles to Sam sites and materials for rebuilding hangers and other depots.

You can define how many planes or trucks there are in a particular hanger or depot and the simulator keeps a tally on where they are and what they're up to. The manual suggests that you could design trucks to look like ships, depots to look like ports and then by colouring the ground blue, hey presto, there is a new sea scenario without changing the principles. In general the documentation is well-written and informative, although not completely without fault.

World has only one thing that I found annoying. For some reason it is often infuriatingly impossible to select an object – but apart from that it is simple and effective to use.



SHAPE ALLOWS YOU TO CREATE AND MODIFY A TORNADO

CONCLUSION

I have mixed feelings about *Flight Simulator Toolkit*. Certainly, some things could have been better – Shape, for instance. The actual playing of the finished game has been known to cause problems. In fact many mouse users will be happy to know that pressing Ctrl-M will solve one particularly frustrating problem. The reason they cannot control the plane is because the simulator has initially assumed that it is dealing with a joystick.

Designing a whole game is a long process – you can't really avoid that, and things will inevitably go wrong along the way. I just think that the tools could have been much more user-friendly. I would speculate that the authors are too familiar with the tools to realise that they might be quite difficult for less experienced designers to use, though this criticism is levelled mainly at Shape. My manual lacked a tutorial section but this has been promised for the production version and I think it will help considerably.

It is a pity that part of the fun is designing things like flying pigs – and that Shape does not make this particularly easy. But the main question is: does *FST* offer something that you cannot get from either *Interdictor* or *MiG-29*? Technically, no, because the concepts are the same – you shoot planes, avoid Sams and capture runways. Nonetheless, there is still a lot of fun to be had, if you can get over the initial frustration.

PRODUCT DETAILS

Product: Flight Simulator Toolkit
Supplier: Simis Ltd, 26 Chitty Walk, Keens Park, Guildford, Surrey GU3 3HW.
Tel: (0483) 233048
Price: £38.25 plus VAT
Machines: Archimedes/BBC A3000

BEND IT

ROB MILLER tries some packages which help word manipulation

One of the most useful parts of Risc OS, and what makes the Archimedes so suited to desktop publishing, is the outline font manager. Rather than being made up of dots on a grid (like traditional bitmap fonts) outline fonts, as their name suggests, are made up from outlines stored as a series of lines and curves, similar to those that you can create using *Draw*.

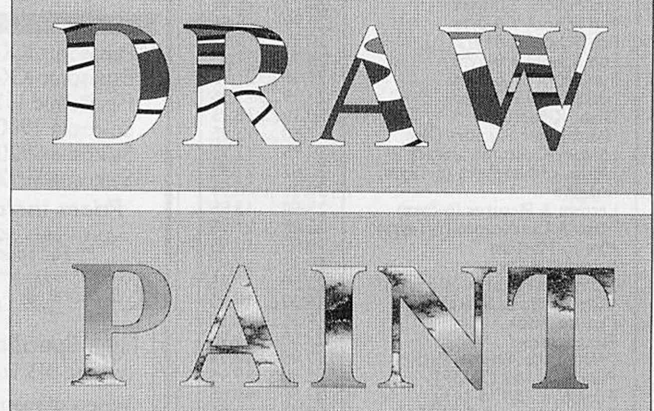
These outlines can be scaled in size to give letters of any size without the loss of smooth edges, both on screen and on paper. The current Risc OS 2 font manager can display outline fonts on screen at any size, although only in a straight horizontal line. For anything off the straight and narrow, these outline fonts have to be converted into

Plain Text
Outlined Text
Hollow Text

Draw format outlines. When in *Draw*, the text can be rotated, coloured or tweaked using *Draw*'s tools and, with a good knowledge of *Draw* and some practice, some impressive effects can be achieved.

Then along came *FontFX* from The Data Store, which not only allowed you to convert text into *Draw* paths, but also added effects, such as shadows, and made the text follow a predefined path. *Poster* from 4Mation expanded on this idea so that text could follow a *Draw* path that you defined, or it could be squashed into a mould.

Now there are a number of applications which do the conversion from outline font to



Draw path, as well as include a number of different effects, such as shadowing and rotation. Most of the concepts and terms used in *Poster* have been carried over to the newer programs. Moulds and paths both originated in this package, but now seem to be used universally to describe the stretching and bending of text. Assuming that you have a copy of *Draw* to help with post production, the effects shown here (apart from the stencil picture above) can be achieved with all the programs we reviewed. Rather than detail each application in turn, I will first explain these effects and then go on to look at each individual package.

A summary of the various effects that each program can produce is given in the table overleaf, indicating where *Draw* is necessary. *Fontasy*, for example, requires *Draw* for producing Bezier paths for text to follow. *Type Studio*, on the other hand, has Bezier path creation built in.

SPECIAL EFFECTS

All of the programs allow text to be produced in any colour and text can be outlined with lines of a chosen colour and thickness. This is also easily done in *Draw*. Once text has been converted into a *Draw* outline, it is simple to rotate words or individual letters to any angle. However, all of the applications allow text to be rotated in various ways before it is exported to *Draw*. Each application also allows text to be sheared, or leaned – this gives the text a sloping effect, either backwards or forwards.

SHADOWS

Creating 'interesting' headings is probably the most common reason for wanting to change the appearance of text. Placing a shadow behind text gives an effect of the text appearing to stand out from the page. These applications will allow you to produce wall (or drop) shadows and floor (or projected) shadows. Wall shadows, as their name suggests, appear behind the actual text and can be offset from the text to give an effect of different sources of light, or can be moved further away from the main text to give a greater sense of depth. Floor shadows are a similar effect to shadows created when the sun is setting, or when a light source is at a low position in relation to the object it is lighting. Although none of the programs create a true shadow, with correct perspective, the effect is nonetheless realistic.

A kind of engraved effect can be achieved by placing a shadow behind some text and blanking out the main text itself. By using two shadows, one opposite the other, text can appear as though it is carved or etched into a surface.

Wall Shadow
Relief Shadow
Floor Shadow
Graduated Shadow
Etched Text

BENDING

Fontasy and *Type Studio* can both allow the text to follow any path that you provide them with. This is a far more flexible system than with *FontFx* which can only draw text on a slope or around a predefined circle, arc or star shape.

The direction of text on a path depends on the position of the first point on the line forming the path. Text is usually drawn from the beginning of a line to the end, although it can be forced to the left, right or centrally justified. Text can also be made to rescale in size automatically to match the length of a particular path – a useful bonus.

HOW THEY WORK

All the programs retain the original text typed in for conversion. In each case, text must be typed directly into the program concerned, to a maximum of 256 characters. There is no option to load text from a file, although by the very nature of these programs, you will only want to input a few words at a time anyway. Once text has been entered into an

THE POSSIBILITIES

	Shadows					Paths			
	Colour	Type	Graduated	Depth	Etched	Slope	Column	Arc	Draw file
Fontasy	✓	✓		✓	(1)	✓	✓	✓	(2)
FontFX	✓	✓			(1)	✓	✓	✓	
Type Studio	✓	✓	✓	✓	(1)	✓	✓	✓	✓
Poster	✓	✓		✓	(1)	✓	✓	✓	✓
RiscOS3 Draw	✓		✓	✓	(1)				

	Scaling	Script files	Moulds	Change outline/fill colour	Rotation	Leaning
Fontasy	✓	✓		✓	✓	✓
FontFX	✓	✓		✓	✓	✓
Type Studio	✓	✓	✓	✓	(3)	✓
Poster	✓	✓	✓	✓	✓	✓
RiscOS3 Draw	✓			✓	✓	

1. Post production in Draw required.

2. Draw must be used to create a path with more than two points.

3. Yes, but letters must be rotated by hand.

application, it is automatically converted into an outline. The computer reads this as a series of lines and curves. Text can only be edited by typing in new text and reconverting it.

However, *Fontasy* does allow the appearance of text to be changed back to the original outline. For example, you can add a shadow to some text, place it around a circular path and then reset it back to the original outline.

None of the other applications allow you to do this without having to start anew. Another plus point for *Fontasy* is that it allows the text to be kerned easily – this is important for headlines where letters such as W and X may look strange given normal spacing.

Some text on a wiggly path

After you have applied your effects, the final result is saved as a *Draw* file. You can also save a special script file from *Fontasy* and *Type Studio* that will allow you to place the same effects on different text, without having to reiterate the procedures involved.

TYPE STUDIO

This is the only one of the applications to include line drawing tools with which to create paths. In use, it is a lot like *Draw* and should be no problem to people familiar with that program. The menus are ranged in a similar fashion and a small toolbox allows instant access to path creation. Because *Draw* is not required for paths and moulds, *Type Studio* will operate easily on a 1Mb machine.

Type Studio incorporates a mould tool – this is one step up from a path and squashes text outlines between two pre-drawn lines. Using curved lines causes text to bulge where lines are further apart, and compress where they are closer together. Offsetting the lines allows text to be sheared left or right, or even up or down. Making the lines different lengths causes text to stretch in a kind of perspective effect. With practice, the mould tool is very powerful.

One tool not present in any of the other programs is Plinth, which merely places a filled (or unfilled) rectangle behind each letter. This effect can be applied to text generated by the other programs with post processing in *Draw*. One final point is that, like *Poster*, *Type Studio* will allow any *Draw* file to be loaded and processed. This means that any *Draw* file, not just text, can have a shadow added or can be squashed into a mould.

FONTFX

This application is very easy to use, while providing some useful effects. It does not have the true path or mould facilities of the other programs, but does have a speciality of its own, namely Stencil.

Setting the stencil option when creating a text outline, draws the outline as normal, but makes the filled part transparent. The area outside the outline is actually filled in, giving a rectangle with a letter-shaped hole in it. An additional border is placed around each letter which can be enlarged or shrunk to cover up as much or as little of the background as required.

Any object which can be loaded into *Draw* can be placed behind a stencil. This includes *Draw* objects themselves, sprites and text areas. Amazing effects can be achieved using this method and it is quite surprising that this feature has not been included in the other applications. *FontFX* is not as flexible as the other applications but is substantially cheaper than the competition. It is certainly a good starting place for producing text effects on a small budget.

FONTASY

Text can be typed directly into Fontasy and it will appear instantly on the screen as an outline. From here, text can be kerned and any other effects directly applied. The ability to reset different effects to get back to a straightforward outline is very useful – it can save a lot of time if you wish to try out different ideas on the same piece of text. It is also quite useful to have *Draw* loaded at the same time as *Fontasy* to produce multi-pointed paths, although this leaves little space for any other applications in a machine with only 1Mb of Ram.

DrawBender is a program (also from ICS) that allows you to take a *Draw* file (in other words, an outline file from *Fontasy*) and stretch it into any shape, in a similar way to the moulds used in *Type Studio* and *Poster*. If you couple this with *Fontasy*, you are in theory getting virtually the same features as *Type Studio*. You will need to use *Draw* in order to create advanced paths – but since this is included with every new Archimedes or BBC A3000, that is no problem.

DrawBender is also free if you buy a site licence for *Fontasy*, which is good value for money at only £25 for a single user version. If you consider the combined cost for *Fontasy* and *DrawBender*, it stands up well to *Type Studio*, although the latter includes the outline font manager.

CONCLUSION

Of the three, *Type Studio* is the most comprehensive. All of the tools you are likely to need are included and there is no need to use any other application with it. *Fontasy* has the useful Undo facility on all its tools, which is handy when you want to experiment. Finally, *FontFX* is the only one to offer a Stencil option.

Type Studio and *FontFX* together are a good match – they share common functions, but it is their extra tools that really make the difference.

DrawBender with *Fontasy* is also a good value combination, although it requires a lot of saving and loading between programs – something that is not easy when you have a machine with little memory or no hard disc.

PRODUCT DETAILS

Product: Fontasy
Price: £25 (single user version), £80 (site licence version, including DrawBender and Placard)
Supplier: Ian Copestake Software (as below)

Product: DrawBender
Price: £15
Supplier: Ian Copestake Software, 10 Frost Drive, Wirral, Merseyside L61 4XL
Tel: 051-632 1234

Product: FontFX
Price: £9.95
Supplier: The Data Store, 6 Chatterton Road, Bromley, Kent BR2
Tel: (081 4608991)

Product: Type Studio
Price: £45
Supplier: Risc Developments Ltd, 117 Hatfield Road, St Albans, Herts AL1 4JS
Tel: (0727) 40303

Product: Poster
Price: £89
Supplier: 4Mation, 14 Castle Park Road, Barnstaple, Devon EX32 8PA
Tel: (0271) 25353

(All prices exclude VAT)

Incidently, the headline on page 120 was created using Type Studio, using the mould option. It could be created equally well using DrawBender

A NEW DIMENSION

Domark's 3D Construction Kit is the nearest thing yet to virtual reality on the Archimedes. **ROB MILLER** looks inside an imaginary world

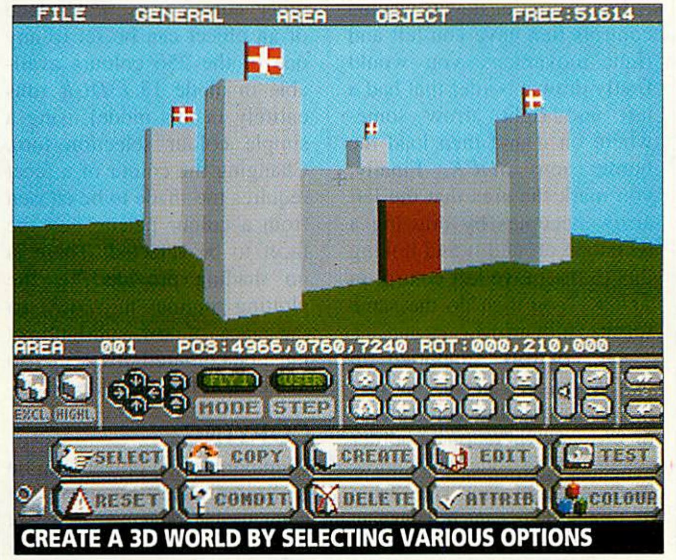
Many readers may recall that, in the heyday of the BBC Model B, games such as *Cholo* were the first step into what is now known as virtual reality.

Cholo was a three dimensional game in which the player explored a whole world through the eyes of various robots. All scenery, including buildings, trees and roads, was shown as wire frame, perspective projections. And, given a certain amount of imagination, you could actually believe you were *there*.

Now, since the advent of fast processing and the greatly increased graphics ability of the Archimedes, three dimensional games have started to emerge. The monochrome, wireframe graphics of old have now been replaced with full-colour, solid images. However, games that have made use of three dimensional graphics have been a bit thin on the ground up until now, with a only a handful of flight simulators plus the odd driving game on offer.

THE REMEDY

Domark plans to remedy the lack of such programs with the conversion of its *3D Construction Kit* to the Archimedes format. As the name suggests, *3D Construction Kit* allows the user to build up a world from simple building blocks, such as cubes and pyramids. The user can interact with each scene with various tools that allow objects to be manipulated. The finished world can then be saved as a stand-alone program which can be run without the original *3DCK* program present.



CREATE A 3D WORLD BY SELECTING VARIOUS OPTIONS

Being a direct import from the PC, the Archimedes version of *3DCK* predictably does not make full use of the Risc OS window environment. Instead, it uses a system of pull-down menus, similar in use to those found on the Apple Macintosh. On loading the program, the screen blanks and, after a few moments, you are presented with a half-screen view into your world, with a selection of tools underneath. A top menu bar provides access to all of the tools via the menus.

Unlike other 3D editors, everything you edit is displayed dynamically in solid 3D perspective – a sort of graphical Wysywig (What You See Is What You Get). There are no plan views or side elevations, so placing objects in line can be quite a difficult task. On the other hand, there is a grid system which allows the shapes to be positioned with a certain degree of accuracy.

Creating an object is simply a case of selecting the create tool and choosing the type of object you want to make from a list. Two and three dimensional objects can be selected, including cubes, pyramids, rectangles and triangles. Once chosen, the object appears in the view display.

The size, position and colour of the object always starts off the same in all cases, but can be altered afterwards to suite the user's design.

NAMING OBJECTS

When a new object is created, its name (such as Cube01) is added to a list of rudimentary objects used in a scene. Having a long list of similar names (if several cubes have been created they will be named Cube01, Cube2, Cube3, and so on) can lead to confusion, so there is an option to change the attributes of the objects, including their names. Objects such as Rect01 and Rect02 could be changed to something more meaningful, such as Door and Window.

An object can be selected for editing by either choosing its name from the object list (this is where the importance of meaningful names becomes apparent) or by pointing to it in the view window. Two extra tools make identification of a selected object clearer.

Exclude isolates the chosen object and only shows that object in the view window. This is useful if the chosen object is the same colour or

close to lots of other objects, such as a panel on a car. Highlight is used to highlight the selected object by outlining it with a flashing box. Either or both tools can be toggled on or off during editing.

Once selected, an object can be moved or stretched in any x or y direction. Objects can also be rotated through steps of 90 degrees in either the x, y or z axes. Some object shapes allow individual points on an object to be selected and moved independently to the rest – for instance, regular triangles (those with three sides of equal length) can be stretched about to make any type of triangle.

MOVING EXPERIENCE

As mentioned before, everything you create is immediately displayed in 3D solid perspective. Using various controls, you can move in any direction. Rotation around the x, y and z axes is also possible allowing the player to easily change direction. All objects within your view are redrawn in real time as you move around, although the more objects there are on screen, the longer the frame update takes.

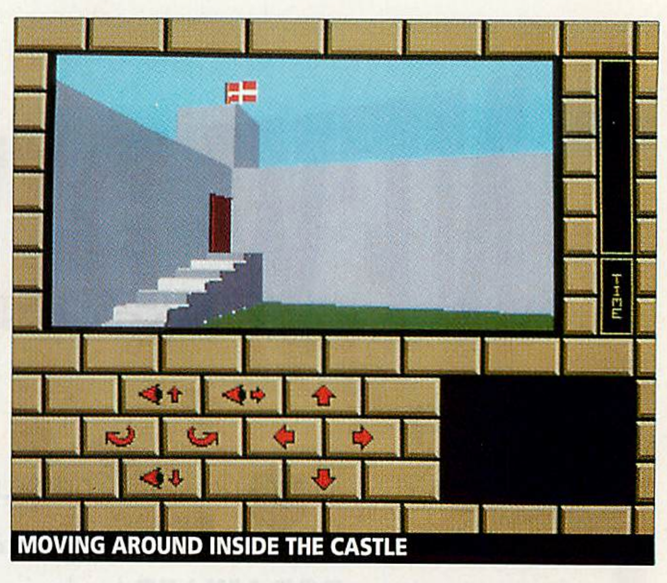
A number of different modes are provided which allow for various types of movement. Walk (the default mode) allows the player to move around in a horizontal plane and climb steps of sensible height. Gravity is fully supported, so walking off a high object causes the player to fall to the ground or next object down. Two fly options allow the player to move freely around a scene, floating from object to object as required. Bumping into any object while moving will stop the player in his or her tracks.

Cameras can be defined and set up in a scene, and moved around with complete disregard for other objects. Although visible, objects are physically transparent to cameras and will not halt movement like the other modes.

When a stand-alone game is created, all that is shown on screen is the player's point of view. Control icons (to provide movement) can be drawn in a separate art package, such as *Paint* or *Arcol,* and incorporated into the finished item on a border that surrounds the view window. Such icons are linked to the game by loading the new border into *3DCK* and marking the area that each icon will use when clicked on.

For example, if you wanted controls that gave you left and right movement, you would firstly draw a border that had a left and right arrow somewhere on it and then load the border into *3DCK.* Finally, you mark the area that the left arrow occupies by drawing a rectangle around it and linking this to the move left control in *3DCK.* You then do the same for the right arrow.

All controls supported in *3DCK* can be carried over to a stand-alone game and can be placed anywhere on a border screen. The view window itself can be any size from quite small up to a full screen. In the later case, controls can be accessed by using keys on


MOVING AROUND INSIDE THE CASTLE

the keyboard to simulate all of the necessary icons.

Being an import from the PC, *3DCK* is blessed with the ability to utilise a 256-colour palette, instead of the 16-colour palette usually found in other conversions. Each face of an object can be set to any one of the 256 colours available in mode 13 (*3DCK* runs entirely in this mode) using a simple colour selection tool. Changing the colour of a facet requires the shade to be chosen from a colour palette and the facet to be selected. There is no shading provided by the plotting routines in *3DCK,* so the sides of any solid object must be coloured differently to make them look solid.

COPYING

Commonly used objects can be replicated easily by using the copy tool. When an object is copied, a direction must be given in which the clone will appear. The copy tool becomes more useful when you wish to copy several objects at once. It can be useful in many situations – for instance when you build a house and want to create a street of similar houses.

Objects can be grouped and treated as a single object and each group can be moved around as a whole, although stretching or re-colouring is no longer available. Individual objects within a group can be edited fully as before.

Strangely enough, groups cannot be renamed to distinguish them from any other groups in the object list. This would have been even more useful than renaming single objects and is a notable omission. Rather than have one great expanse, *3DCK* allows you to create a number of areas which can be linked together to form your 3D world. In most cases, you will probably want to have more than one room or area in a world. For example, you may want a house which is viewable from outside, but with separate rooms inside. Areas are best thought of as different

A SOUND OPTION

Like good graphics, sound can greatly enhance the overall feel of a game. So it's good news that 3DCK allows sampled sounds to be implemented and played when selected objects are activated, shot at and so on.

Six rather boring sound effects are built in to the program, but there is also provision to include your own samples. These can be created with samplers such as Clares' Armadeus, or extracted from Tracker tunes and the like.

There is no option to change the pitch of a sample so if you want a rising tone, you would have to incorporate a number of samples at different pitches, which could be played in order. Up to 25 user samples can be added so it would be feasible to play tunes if the different notes were present.

No use is made of the Archimedes' stereo capabilities which is a shame, as it would have been great to pan around an area and the hear the noise of an object moving around according to your position.

ELEMENTS TO BE ALTERED CAN BE SELECTED EASILY

rooms in a building where you can't see from one room to another. Each area can have a number of entrance and exit points, so it is possible to have areas 'within' areas, such as a cupboard in a room in a house.

INTERACTION

One of the key features of *3DCK* is its ability to interact with objects that you have created. There are three ways you can interact with objects: colliding, activating and shooting. This is done via a special programming language incorporated in the editor. If you are familiar with Basic (the language supplied with the Archimedes), you should have no problems creating the small programs that are required to control objects.

Each object that you intend to manipulate has its own associated program, which is normally quite short – typically, five to 10 lines. Most programs are written to test if a condition is true – have I bumped into this object, or has this object been activated, or perhaps shot? Programs are linked to objects by selecting the object name from the object list and creating a condition for it.

A simple program to test if the player has walked through a doorway, or rather bumped into the object that represents a doorway, may look something like this: IF COLLIDED? THEN GOTO (1,2) ENDIF which translates as – has the player bumped into the doorway object? If so, then move the player to a new area and end the condition. Of course, this is only a very simple routine and *3DCK* contains other features that can be implemented via the programming language.

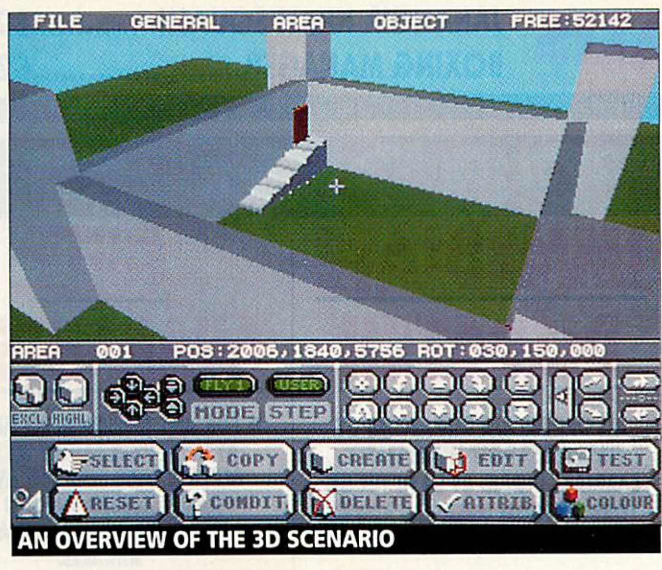
FEATURES, SUCH AS HIGHLIGHTING, CAN BE ADDED

Objects can be made visible or invisible, which is useful when you want to shoot at something and make it disappear. Doors can be made to open by having two different states for the door to show open and closed.

MOVE IT

Objects can not only be made to disappear, but they may also be moved around an area. Using loops in an object's control program allows it to be animated. For example, a portcullis could be made to slide up or down.

But animation is not just limited to objects – even the player can be made to move around an area on a predefined course, like riding on a train. The use of variables in a program allow various events to be recorded, such as particular items being picked up, or how many times an object has been shot. The values held in variables can be displayed numerically or graphically on the final game screen. One typical use would be to show the score of a player or the amount of energy he or she still has.



AN OVERVIEW OF THE 3D SCENARIO

Once you have created all the areas you require and filled them with the necessary objects, the whole lot can be merged together to create an original stand-alone game. The original *3DCK* is not required in order to run the final game.

In fact, games created entirely by the user are not bound by copyright and can therefore be swapped. I'm sure it won't be very long before we see games created with *3DCK* springing up all over the place, on bulletin boards and Public Domain libraries.

CONCLUSION

Because it uses none of the window side of Risc OS, but relies on its own system of menus, *3DCK* can take some time to get used to. The manual is written quite clearly, although it suffers a little (as does the program itself) from being a conversion from the PC/ST/Amiga.

3DCK is not intended as a technical 3D design tool. Compared to a product such as *Euclid*, it is vastly lacking in a lot of areas. For example, there are no separate view windows for different elevations and there is no facility to zoom in and out. Also the fact that no automatic shading is implemented makes lighting effects impossible.Although I would not class *3DCK* as a serious product in a designing capacity, it might find its way into some schools on the strength of its immediate representation of objects when designing – the last thing children want to do is wait for something to happen.

What *3DCK seems* ideal for is creating 3D game environments. Incentive, the company which produced *3DCK,* has already come up with a number of highly acclaimed games created with the system. Perhaps now there is an editor, we might see the likes of *Driller*, *Darkside* and *Castle Master* making their way into the Archimedes games arena in the near future.

If you want to get a taste of what virtual reality is all about, then *3D Construction Kit* is both reasonably priced and the best product currently available for the BBC A3000/ Archimedes. In the right hands it can provide hours of fun and, theoretically at least, may help to produce some decent 3D games as well.

PRODUCT DETAILS

Product: 3D Construction Kit
Suppliers: Domark Ltd, Ferry House, 51-57 Lacy Road, London SW15 1PR.
Tel: 081-780 2222
Price: £42.55 plus VAT
Machines: BBC A3000/ Archimedes

FREE – D

Subscribers can get a taste of what 3DCK is capable of by looking at this month's free subscriber's disc. A game created with 3DCK is supplied on the disc. All of the controls are quite obvious: clicking on the left arrow will move you left, and so on. The left-hand mouse button will fire at objects in the view window and the middle button will pick them up or activate them if possible. The two mouse buttons also have different effects on the movement controls, although these will be obvious when playing the game. Have fun!

The subscriber's disc contains many of the programs featured in each issue. For further details of how to subscribe, please turn to page 29.

TAKING NOTES

RICHARD GARRETT discovers how the Notate package can help put your musical efforts into print

If you are one of those budding musicians who likes to see the music you make, then a new music notation package from Longman Logotron could be just the ticket.

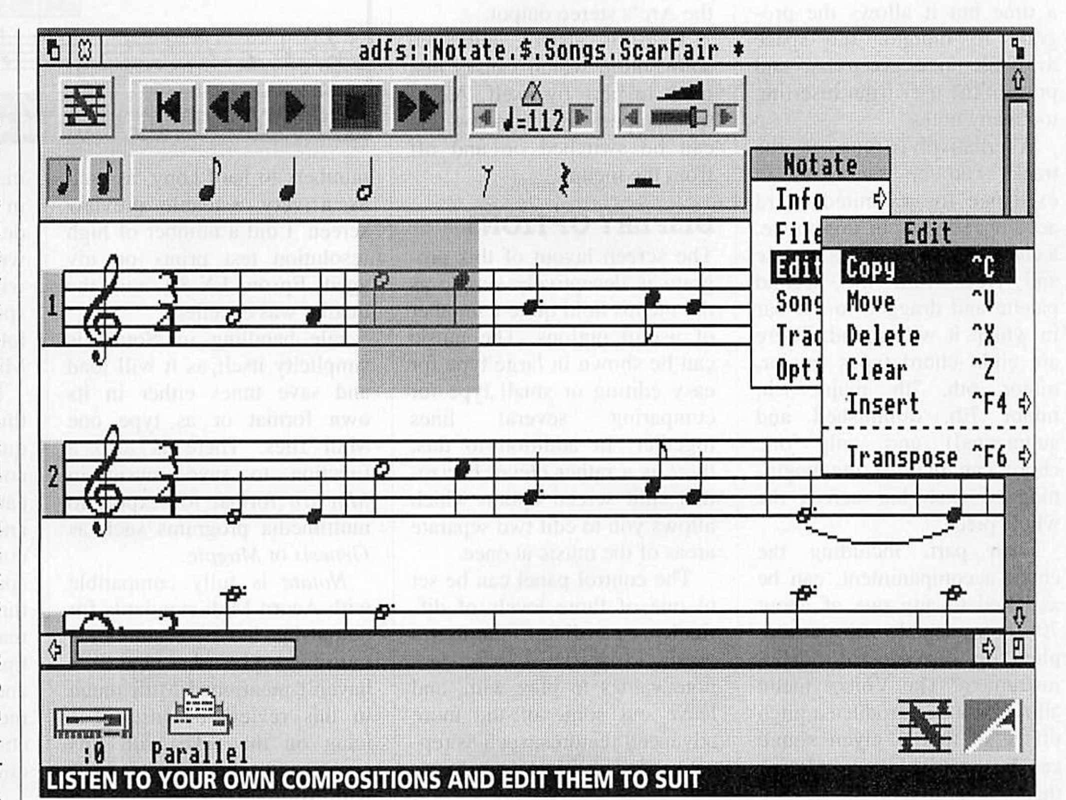
Notate is, according to the manual, a 'music composition application' – not the most precise definition I've ever heard, but there you are. Most current music software falls into one of two categories: sequencers, which 'record' sequences of notes and then play them back through synthesizers of some sort; and music printing software which allows a composer to write a complex score from the computer keyboard and then print out legible parts for whoever is going to play it.

This new package falls somewhere in between the two definitions, in that it is an eight-track, stave-based, step-input, monophonic sequencer with good print facilities. Phew! But, more importantly, it is a program that lets you hear written music.

The manual says (perhaps rather boldly) that *Notate* is suitable for users with no particular previous musical knowledge'. I found that notation was a huge obstacle to learning music and it took me about 10 years of playing before I became confident enough to know what those funny dots actually sounded like. So, it was with these misgivings that I first fired up the program disc.

GETTING STARTED

Notate comes on two discs, one containing the program and the other holding extra voices such as drum beats and saxophones. It will run on any Archimedes/BBC A3000 with 1Mb or more of memory, although 2Mb is recommended. Once *Notate* is installed, you can either load a file from disc, or start a new tune by selecting the N symbol from the icon bar. When you start a new tune, a window opens to display a five-line stave and a grey control panel.



LISTEN TO YOUR OWN COMPOSITIONS AND EDIT THEM TO SUIT

It has two groups of buttons. the first comprises 'tape recorder' controls: a metronome and a volume knob which together control playback of the music. The second forms a palette of symbols (notes, rests, repeat marks, and so on) which are used during composition. Other less frequently used commands are available by pressing the menu button.

WRITING MUSIC

In *Notate*, a piece of music can be written in any key and any time signature between 2/4 and 12/4, or between 2/8 and 12/8. It will play music back in any tempo from 30 to 250 beats per minute. Only one key and one time signature are allowed in any single tune.

The program uses up to eight note durations from a semi-quaver (sixteenth note) to a semi-breve (whole note). When the tie symbol is used, continuous notes can be formed of a length equivalent to any number of semi-quavers. Triplet notes (twelths of a bar) are not supported, which is a shame, particularly if you happen to like British and Irish folk music.

Writing music is easy – you just drag the note value you want from the palette and, when you let it go at the appropriate point on the stave, the note plays so that you can check the pitch. If you put a note in the wrong place, you simply pick it up again and drag it to its proper position or discard it by taking it back to the palette. The same procedure applies to inserting and editing rests (pauses) and accidentals (sharps and flats). Blocks of notes can be selected and then moved, copied, deleted or transposed by a number of semitones via the Edit menu.

To repeat a phrase, rather than copy the whole thing out again, you can use a variety of symbols to modify the structure of the tune. The simplest of these are left and right repeat marks which, when placed like brackets around it, cause a phrase to play twice.

In addition to this, you can use the following musical conventions: DC (*da capo*, or back to the top); DS (*dal segno,* or back to the squiggle; and Fine (which stops the music at fixed point before the end of a repeat).

A point to note is that there is no facility for multiple or nested repeats – the software interprets two right-hand repeat marks next to one another as an endless loop command.

MULTITRACKING

Notate supports up to eight parts or tracks, each one of which is dedicated to an individual Archimedes sound channel. This means that each track can play only one note at a time but it allows the program to monitor the space available in a given bar and prevent the user from inserting too many notes.

Alternatively, four of the tracks can be sacrificed in exchange for a limited chord accompaniment. In this mode, a chord is selected by root note and type from the second palette and dragged to the bar in which it will sound. There are eight chord types (major, minor, 6th, 7th, major 7th, minor 7th, diminished and augmented) and only one chord can play at the beginning of each bar across the whole piece.

Each part, including the chord accompaniment, can be assigned to any one of about 70 instrumental voices supplied on disc or to a Midi instrument. The Voices menu allows you to introduce a pitch offset so that a given sound can be heard higher or lower than it is written on the stave.

Chords are shown by the usual letter symbols and monophonic parts can be displayed in treble or bass clef or as a single line for untuned percussion. One really neat feature of *Notate* is that when you copy a phrase between treble and bass parts, it is automatically transposed by two octaves to compensate.

The program does not use notation to control the loudness of the instruments relative to one another (dynamics) but consigns these functions to what looks like a neat mixing desk. Each channel is assigned a slider which controls its volume and a rotary 'pan pot' which positions the sound in the Arc's stereo output.

There is also a numbered solo button which causes that track to play by itself. All of this happens in a window that can be switched on and off from the menu.

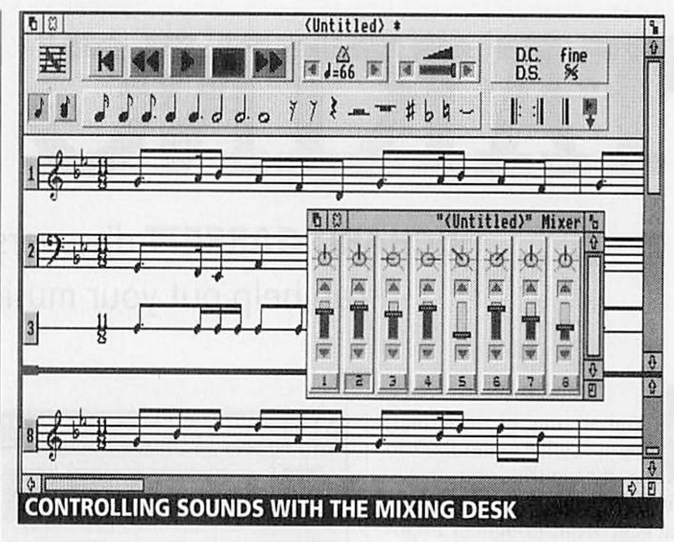
DISPLAY OPTIONS

The screen layout of this program is deceptively simple as the menus hold quite a number of useful options. The music can be shown in large type for easy editing or small type for comparing several lines together. In addition to this, there is a rather clever horizontal split screen option which allows you to edit two separate areas of the music at once.

The control panel can be set to one of three levels of difficulty, according to the user's needs. Lower levels offer less note values to play with, and leave out some of the more advanced features, such as repeat marks, accidentals and ties.

PRINTING

Notate does all its printing via Risc OS drivers and has three print sizes in both portrait and landscape. There are a number of options that add the title of the piece, page, track and bar numbers to hard copy, as well as a very readable preview screen. I did a number of high resolution test prints on my aged Epson FX-80 and the quality was excellent.



CONTROLLING SOUNDS WITH THE MIXING DESK

File handling in Notate is simplicity itself as it will load and save tunes either in its own format or as type one Midi files. There is also a function to save music in *Maestro* format for export to multimedia programs such as *Genesis* or *Magpie*.

Notate is fully compatible with Acorn Midi standards for output but has no features for music keyboard input. I haven't mentioned Midi much in this review because it is icing on the cake with this package. It works very well with Midi but can be used just as easily connected to headphones or a domestic hi-fi.

CONCLUSION

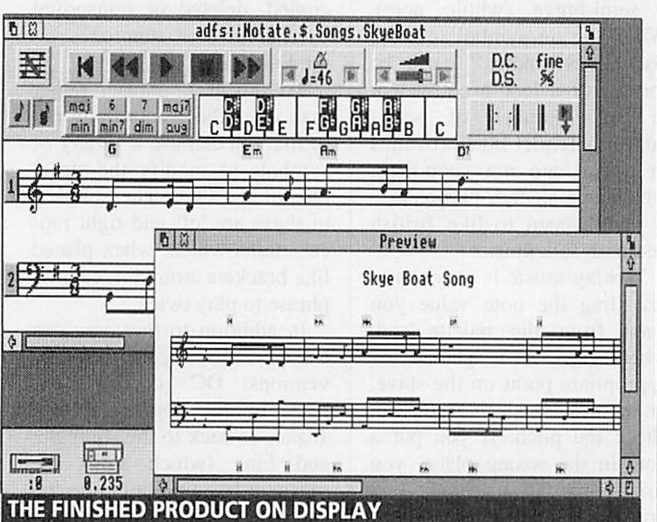
I like this package a lot. It combines a simple, uncluttered display with good sound samples and print facilities to produce something that is very 'clean' and comfortable to use. The authors have paid such rigorous attention to both Acorn and musical conventions that operating instructions are almost irrelevant and, as if that wasn't enough, they have supported it with one of the best written manuals I've seen for some time.

The program is so easy to use that relating notes on the page to the sound you hear becomes automatic. The documentation says that *Notate* is for use in schools at National Curriculum Key Stages two-four upwards. I would recommend it to anyone, at home or in school, who wishes to develop their understanding of written music or to experiment with sequencing from the perspective of notation. It saves a lot of initial expenditure on Midi gear.

My only complaint about this package is that it doesn't quite do everything I want. Of course, music is as complicated as you want to make it and the software needs of composers expand to fill the space available, but there are three extra features I could really use – triplets, multiple time signatures for short bars and polyrythyms – and some method of writing dynamic changes into the song file (automated mixing perhaps).

That much said, *Notate* is a well-designed, powerful application and with a few more features it could be amazing. Apart from being suitable for those who have no 'particular previous musical knowledge', it is also fun. To use dots, one must hear notes and *Notate* allows you to hear those notes as you write.

I wish it had been around when I was twelve and starting to get into music – it would have made life at lot easier!



THE FINISHED PRODUCT ON DISPLAY

PRODUCT DETAILS

Product: Notate
Supplier: Longman Logotron, 124 Cambridge Science Park, Milton Road, Cambridge, CB4 4ZS
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Price: £59 plus VAT
Machines: Archimedes, BBC A3000 with 1Mb (2Mb recommended)

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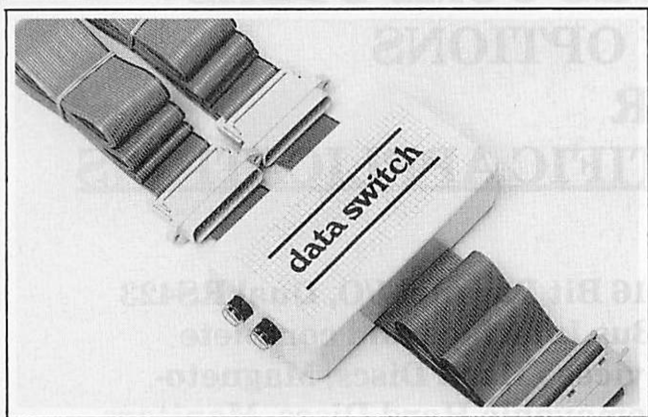
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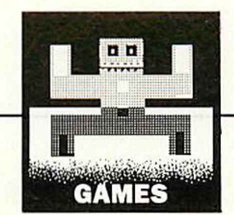
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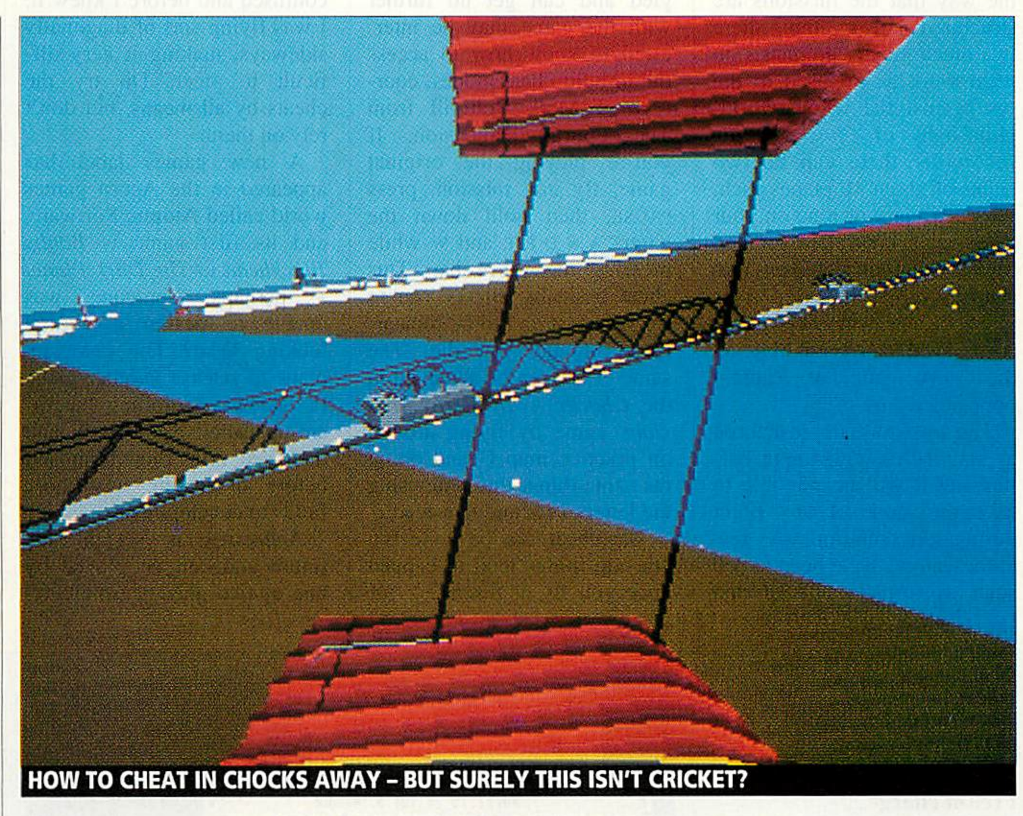
GAME SHOW

The past few years have seen an increase in the use of virtual reality, as engineers not only realise its potential, but also discover that it is possible to produce on just a couple of microcomputers. More often than not Acorn's Risc OS machines play centre-stage in such considerations.

For those not familiar with virtual reality the buzz word is interaction. Whereas in a normal computer game you only react to things happening on the screen in front of you, a virtual reality game attempts to put you inside the world of the computer, to make you feel closer to the game action. The best known results are achieved when the player wears a data suit, which records the movement of limbs and sends signals back to the computer. Meanwhile two tiny colour monitors, contained in the player's helmet, create a game world in 3D that can be seen and touched. When a player moves it feels as though he or she is actually moving around the game scenario.

Acorn machines have been used for experimenting in this area and the Guildford-based company, Simis, helped to produce a virtual reality version of *Interdictor*, shown a while back on *Tomorrow's World*. As yet, nothing is really available to the general public, but at least one project is underway. By the end of this year we might be lucky enough to see the fruits of Ray Maidstone's hard work.

Regular readers may remember that in the *BAU* November 91 Games Supplement we reported that Ray's company was busy at work on the mega game, *Tale of Anubus*. Well, *Anubus* wasn't ready in time for Christmas because the authors did not want to compromise on quality, but they say that it should be finished for Easter.



HOW TO CHEAT IN CHOCKS AWAY – BUT SURELY THIS ISN'T CRICKET?

Once that's out of the way Ray has four projects (all connected with virtual reality) to be getting on with. These range from a £4000 professional kit (which will appeal to slot-machine arcades somewhat more than to your average family) to a pair of 3D glasses selling for about £10 each. Naturally, an Acorn Risc OS machine will be at the heart of each system.

The professional system will probably consist of a six foot square arena and a player's helmet, which will be totally self-contained to give the user complete freedom. A sit-down version may also be available, for as little as £100, in which players perform a walking motion with their feet as they sit on a chair. However, the helmet itself will still cost around £200. This is where the 3D glasses may save the day for anyone on a tight budget – as long as you've got two monitors. To create a 3D scene the glasses will simply combine refracted images from two slightly different monitor images, therefore shedding a whole new light on games such as *Gauntlet*.

The systems also have potential in areas such as buying new furniture. By recreating your living room on-screen you can insert sofas and chairs before wandering around to see how it all looks!

As if this isn't enough, Ray Maidstone also has plans for four sequels to *Tale of Anubus*, including a space version and a horror game involving vikings. The latter was originally intended to be made into a film – but Ray thought he could do it better on the Arc. We shall see. We might also see the release of yet another driving game, one that is very realistic this time. Apparently *Saloon Cars* and *Chequered Flag* aren't quite realistic enough for Ray...

In *James Pond*, the underwater adventures of a secret agent with fins, reviewed in *BAU* February 92, your aim is to save the world from ecological disasters – a task easier to achieve if you cheat! I won't spoil the game, but if you press TAB and then type in the name of a famous guitarist from Sweden, you'll be able to use the number keys on both the keypad and the main part of the keyboard to skip levels and so on. Happy guessing!

It should not be long now before The Fourth Dimension releases *Spitfire Fury*, another vintage aircraft game by the author of *Chocks Away*. So

apart from upgrading the Tiger Moth to a Spitfire, what's the big deal? Well, from early screenshots it does look a lot like *Chocks Away* and I would imagine that the plane handles in exactly the same way with roughly the same capabilities, making the two very similar.

The difference is more in the way that the missions are structured. For one thing there is a much greater emphasis on team work as opposed to the 'us against the whole world' philosophy of *Chocks Away*. In *Spitfire* there can be two teams of about 10 planes each, the other eight or nine on your team being controlled for you by the computer. Given that *Spitfire* supports two players in the same way as *Chocks Away*, you can both play on the same side or captain opposing teams.

The missions are structured as six, increasingly large battles and it will be possible to save the game at any point during the mission. A few extra features have been added such as torpedo attacks and bombing raids but apart from that it looks as though many of the original *Chocks Away* enemies will be rearing their heads once more. Watch out for a review soon to decide whether *Spitfire* is worth buying to add to *Chocks Away*.

On the subject of *Chocks Away*, readers who have struggled and can get no further with the game may be interested to know how to access the in-built cheat modes, courtesy of Mark Botterill from The Fourth Dimension. If you're playing the original game, fly any mission, press PAUSE, then hold down the letters A N D R E and W while pressing the space bar. This cheat basically allows you to fly very fast and to be reincarnated should you die. The same effect can be achieved in the *Chocks Away Extra Missions* game by flying around on practice map C and doing the same thing, this time using the letters T I M and E instead.

The cheat can be quite fun but odd things tend to happen once you fly at mach 2 – for one thing there aren't any brakes! Also, the bullets can't keep up and you end up firing out of your back.

Stranger things have also been known to happen. For some reason, while flying at some large mach number and fast forwarding at the same time, the computer got a bit confused and before I knew it, I was flying sort of diagonally sideways, making it very difficult to steer. Do try the cheats by all means, but don't rely on them.

A new games label has appeared in the Acorn games world called Atomic Software, and its first game is *Bobby Blockhead vs The Dark Planet* – perhaps, someone was unable to design a normal looking head? The company plans to release another game (a sideways-scrolling shoot-em-up called *Aggressor*), and then see how they both sell before dedicating any more funds to development.

Aggressor is set in the future and can be played by one or two players simultaneously. The Earth has been overrun by aliens and much of the human race wiped out, save a small handful that escaped in space ships. Your task is to invade your own planet and rid it of the unwelcome intruders. As is customary in such games there are bonuses to pick up which will enhance your fire power or abilities in some way.

Finally, fans of the highly addictive game *Cataclysm*, from The Fourth Dimension, can look forward to some extra levels. That solves one of the main problems with the original game, there being only 40 levels which don't last more than a week as the game is so addictive. By Easter time another 40 levels will be on sale to keep Cataclysers going another seven days!

Sam Greenhill

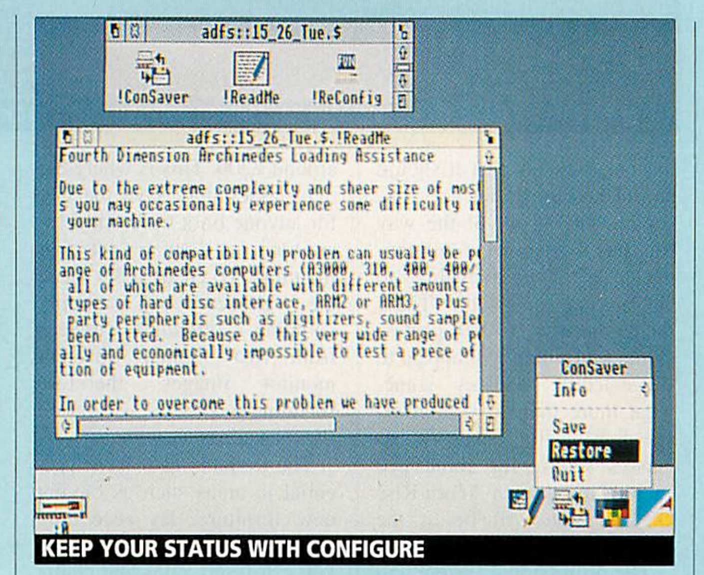
If you aren't already feeling waterlogged from our liquid programme on page 71 then have a go on our playable Cataclysm demo, free on the monthly subscribers' disc.

CONFIGURE

The Fourth Dimension
Tel: (0742) 700661
Risc OS machines
Free of charge

Configure is an application, produced for users who find loading software a problem when there's not quite enough memory available – a common occurrence in 1Mb machines. Provided free of charge, it was developed by The Fourth Dimension because its games tend to be fairly memory hungry. However, the company have admitted that it will work with any software giving you memory problems.

The disc contains two applications, and a *ReadMe* file explaining how to use the software. If your game is failing to load properly or cannot claim enough workspace from Risc OS, the application called *ReConfig* is the one to run. It will optimise the settings of certain parameters (stored in the computer's CMos Ram) to the best conditions for running a game. However, because CMos Ram is powered by battery, the changes will be held in the computer even when it is switched off.



KEEP YOUR STATUS WITH CONFIGURE

You will have set up your machine to your own personal preferences using the *CONFIGURE command, and probably don't want them messed up, which is why *ConSaver* is supplied. This will save your machine's CMos Ram status to disc.

Be sure to use *ConSaver* first! It installs itself on the icon bar, and from the menu you can either save the machine's current configuration – which you should do before running *ReConfig* – or restore a previously saved configuration, which you will probably want to do after playing a game. Of course, if you are experiencing problems running software, there are always a few things you can do before you even need to touch these utilities. The most obvious thing is to try adjusting the memory allocated to different areas of the computer's memory, using the Task display window (accessed via the far right icon on the icon bar).

Anything changed there will not affect the battery-powered CMos settings, so you can fiddle about as much as you like. If you get in a mess you can always reset the machine to the settings it had when it left the factory by turning it off, holding down the R key and then switching the computer on again, releasing R only when you see the desktop.

If you would like a copy send an SAE to The Fourth Dimension, 1 Percy Street, Sheffield S3 8AU and ask them nicely to post you one.

Sam Greenhill

Q-MASTER

The Fourth Dimension
Tel: (0742) 700661
BBC 5.25in £12.72, Master Compact £13.57 plus VAT

The Fourth Dimension, better known these days for its Arc software, has released a Pool game for the BBC.

Two people can play and the computer will stand in for one or both competitors. The table is viewed from above with the status section at the top and, in practise mode, at the bottom as well. It only uses four colours (one less than the minimum required) so both the cue ball and the number eight are black. Fortunately the latter is marked with a number eight.

To hit a ball you move a crosshair around the screen until it is vaguely over where you want the cue ball to go. Pressing RETURN, or another user selected key, advances the player to a fine tuning session, letting you alter where the cue hits the cue ball, the angle of the cue to the table and the power of the shot.

Power is measured by an ungraduated bar. However, the keys move the bar at a furious rate and the fine adjust control showed little evidence of working. This seems to be the only skill in the game. A key press plays your shot and there is an action replay option.

Graphics are basic to say the least: the crosshairs are small and hard to place accurately, and the Beeb's nasty shade of green is used to sickening excess, although it does seem to be toned down on the packaging. The sound is similarly unexciting – a bit of white noise and the occasional beep, although arguably that is all that's required.

Although the score tables have to be loaded manually (because none are supplied) it is quite fun to play, the strongest point being the computer player. There are eight levels of difficulty and a novice can equal the computer at level one. However it pots balls with remarkable frequency at higher skill levels. Is Q-Master cheating by peeking at it's own internal co-ordinates? Call me a cynic, but it certainly seems that way!

THE BBC TAKES TO THE GREEN BAIZE

Overall, it gives an impression of having been written overnight in Basic. I know that the Beeb games market is a bit quiet at the moment but I am amazed that The Fourth Dimension could do no better than this.

James Weeks

THE MAGNETIC SCROLLS COLLECTION

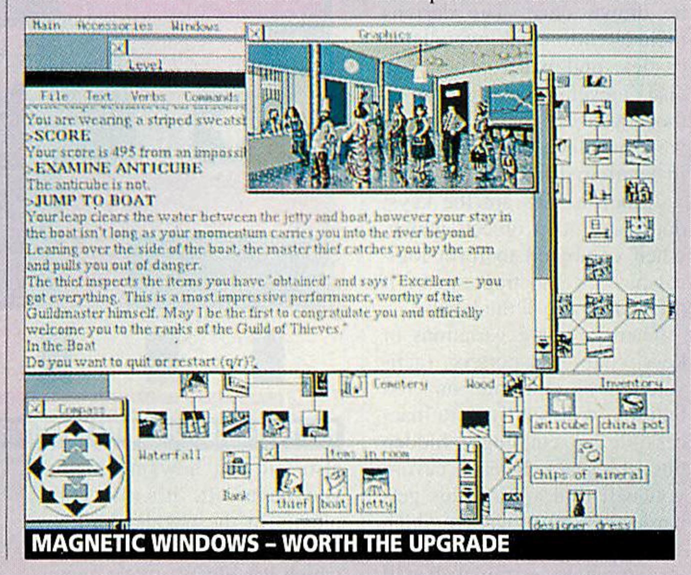
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Almost a year ago Virgin released Magnetic Scroll's *Wonderland* to an eagerly awaiting public. Somewhat pioneers amongst the adventuring fraternity, Magnetic Scrolls had developed a window environment for the game called Magnetic Windows. Text appears in the Adventure window in the normal way, but with a flick of the mouse you can summon up an inventory, compass, graphics and even a map-making window. Objects can be dragged between windows; to examine one double-click on it. And if this isn't enough, many of the graphics are animated and some versions, though sadly not the Archimedes, have music.

Unfortunately the Archimedes' own desktop wasn't used. Instead, a grey dithered affair with rounded buttons was used, somewhat reminiscent of a waterproof overcoat. This is a shame, but then we Arc users were lucky to get an adventure of this quality at all. And if you have a multisync monitor, then the environment makes use of it, giving better aspect ratios on the windows and, of course, giving you more screen to work with.

Virgin promised that Magnetic Scrolls' back catalogue would be converted to the Magnetic Windows environment, and sure enough Collection One is now available for the give-away price of £25. It contains *Fish!*, *Corruption* (both runners-up in the Best Game 1990) and *The Guild of Thieves*. A somewhat odd choice in my opinion; as there have been three Kerovnian adventures – *Pawn*, *Thieves* & *Jinxter* – why not bundle these and put *Fish*! and *Corruption* in a second collection.

I seem to have covered these games many times in the past, so I'll just give my two word description of each: *Fish!* – great fun; *Corruption* – very tricky; *Guild* – standard adventure. All have excellent puzzles and well thought out scenarios. New comers should start with *Fish!*, move on to *Guild*, set in very odd places, and finally *Corruption*.



MAGNETIC WINDOWS – WORTH THE UPGRADE

Obviously they are the same as their predecessors although it is nice to see that some of the graphics have been animated, though nothing quite as grand as the Duchess' house and kitchen in *Wonderland* – just a bubble here, a flicker of flame there and the odd deckchair or two. *Fish!* and *Guild* have their tongues firmly in their cheeks. For example there's an empty stable in *Guild*; if you type SHUT DOOR, it replies 'It's a bit late for that, surely'. Not a game for the serious minded. The full help system provided is a little too easy to access – it's very tempting to take a quick peek. I'd like an option not to copy it when you install the game.

To sum up, an excellent collection of very good adventures. Even if you already have some, it's worth the money to get the window versions.

David Lawrence

KARMA: THE FLIGHT TRAINER

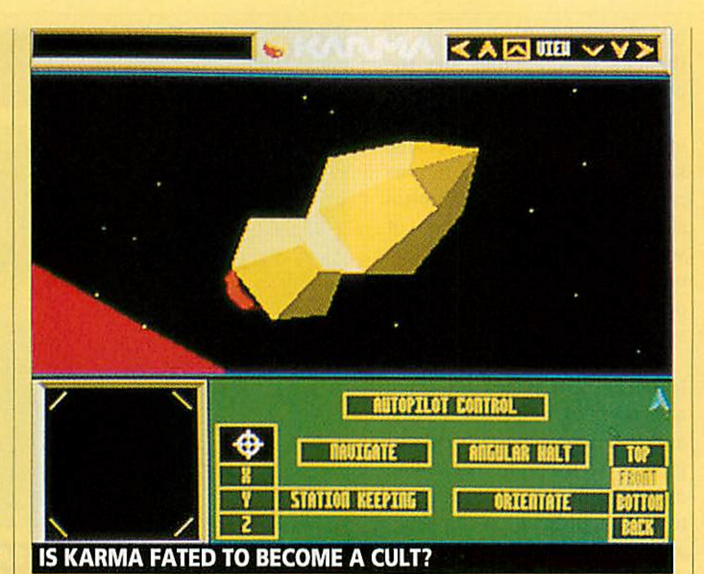
Periscope Software
Tel: (0462) 893107
Risc OS machines
£24.95

Well, *Karma* is here at last, but was it worth the wait? Actually, it's not over yet as Periscope is releasing it in three parts. Part one, *The Flight Trainer*, is simply a front end that lets you fly around the galaxy and explore.

It's a big game, and *The Flight Trainer* is only a small part, coming on two discs. The manual describes your aims, and the laws of physics that shape and effect the universe you will travel in. To load the trainer double-click on the *Karma* icon; it is fully Risc OS-compatible. Part one runs on a 1Mb machine, but the rest will need at least 2Mb of Ram.

You begin in the mother ship, designed for long range, interstellar travel. The control panel and view windows are disappointing to say the least. One shouldn't judge a book by its cover, but in *Karma*'s case a little more care over presentation would have made it more interesting.

Sound is minimal, but this is in fact more realistic than other space games – space is a vacuum, and nothing can be heard in such an environment.



IS KARMA FATED TO BECOME A CULT?

In part one you have to complete the missions set by the Galactic Council, such as locating your Hopper craft, and finding the Council's Training Post. Simple on-board comms let you talk to passing satellites, some of which will pass on vital information. Flying is as realistic as you can get considering the limitations of a mouse and keyboard, although voltmace joysticks are supported.

An autopilot option makes flying around easy. Just select the object you want to fly to, drop it onto the autopilot window and your ship will head in the right direction. However, large distances take a long time, often requiring a few shorter journeys to aid navigation. A separate navigation display shows the state of your ship's engines, your speed and the distance to the target.

Depending on your distance from a selected object, in-built sensors will provide brief or detailed information. If you select a sun on the other side of the galaxy, only its size and approximate distance are displayed. If you are within a sun's system far more detailed data can be obtained.

Within a sun's system, any planets in the vicinity will be displayed with full details for each. Considering the size of the galaxy, there are an awful lot of stars and planets to visit – certainly enough to keep you busy until part two is released.

You will occasionally come across other ships and it's here that the promised 3D graphics come into play. All ships are displayed using 'point of light shading', that is the different surfaces get lighter or darker, depending on their relative position to a light source (typically a sun). The effect is pretty good, although if you are looking at a ship with the light source in the distance, it may appear as a grey blob.

After playing (sorry, using) *The Flight Trainer* for a few hours, it soon became obvious that *Karma* is not so much a game as a complete universe simulator. Getting used to flying your ship takes time so buying *The Flight Trainer* can be regarded as an investment for the future releases.

It's hard to judge only part of a program, but the remaining two parts will have to be more involved if *Karma* is to succeed in the long run.

Rob Miller

BOBBY BLOCKHEAD

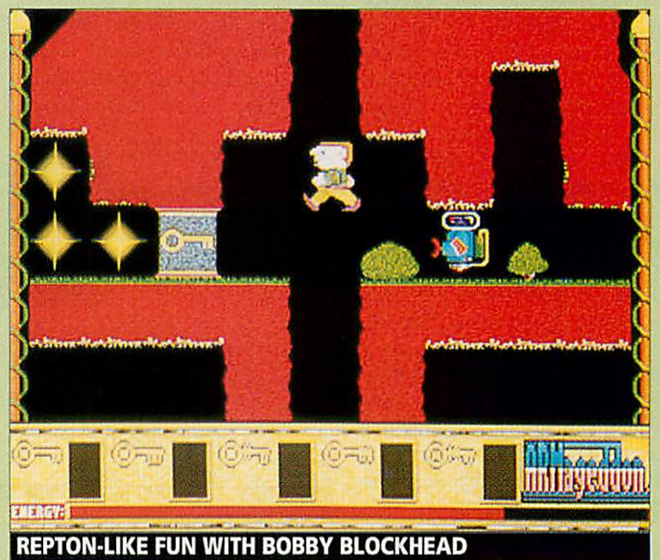
Atomic Software
Tel: (0733) 53355
Risc OS machines
£19.95 plus VAT

Similar in idea to the old *Repton* saga, you have to journey around a series of caverns, to save the universe using, according to the manual, only your 'skill, luck and fresh-breath confidence'.What gives it an edge is that there are with 25 fiendishly designed large caverns full of wasps, teleporters, keys and doors. Once you have completed a level you receive the passport so you can carry on where you left off.

The graphics are of the re-usable block type – the same chunks slot together in many variations. Because they scroll around you in all directions, it gives a smooth appearance. However, they don't have a professional quality which is a pity – there are relatively few of them and they only had to be drawn once. The designs include earth, rock, woodland, castles, and water. There are also clever blocks, such as those you can only cross one way, or which push you along in a certain direction.

Added to this are the keys, doors and other objects which, when combined to form logical puzzles and traps, make it difficult to finish the levels.

There are five variations of keys and transporters (activated by jumping on red buttons) will send you to inaccessible or cunningly hidden bits of terrain. In each cavern you will find a map (this gets harder as you progress) which you can look at by logging on to a computer terminal. It will also tell you how much time you have left. It's the complexity of the puzzles built-up from simple components which has always made games like this fun, and *Bobby Blockhead* is no exception – being on a par with *Repton* at its most addictive.



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Mat Tizard

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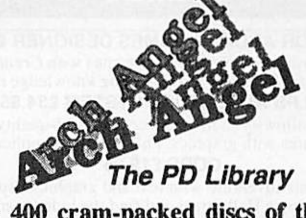
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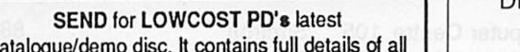
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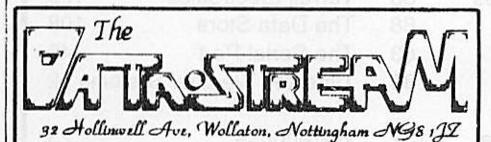
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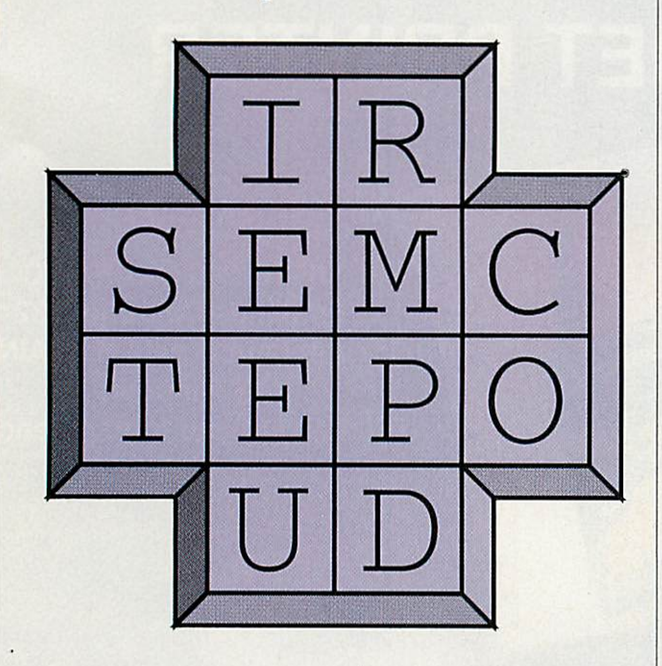
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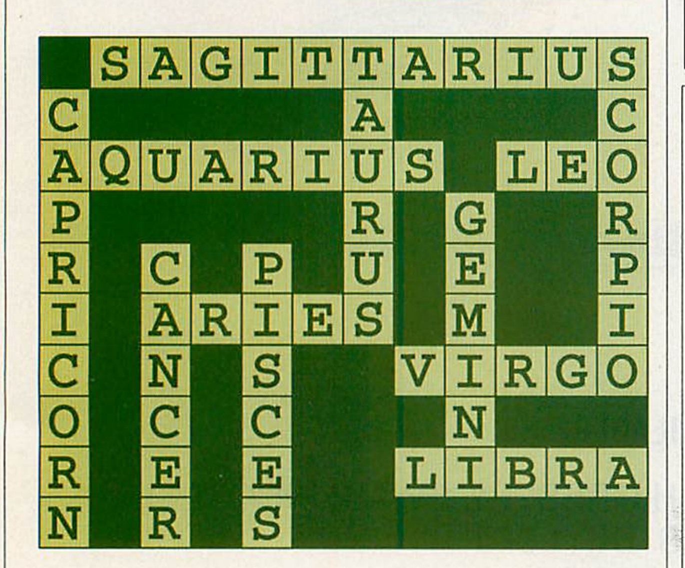
How many words of 4 letters or more can you find in the Pathword grid? Move horizontally, vertically or diagonally between letters using none twice in a word. There is one 12 letter word. No proper nouns, plurals or abbreviations please. Average: 65, good: 80, excellent: 100+.

Once you have found all you can, send your list to: March competition, BBC Acorn User, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Please write on the back of your envelope the number of words you found. The winner will be the person who found the most words (including the 12 letter one). Closing date is Friday 13th March 1992. The solution and winner will be published in the May issue.

The winner of January's Juggler puzzle was Antony Marsh of Ipswich with a grid of 126 (9x14). The smallest grid we managed was a mere 12x10, as shown below.

Solution to February's Colour Scheme

		M		C		B				
		A		Y	E	L	L	O	W	
		G		A		U			H	
G	R	E	E	N		E			I	
		N							T	
		T						R	E	D
B	L	A	C	K						



Zombie, zombie!

For our foray into the one line entertainment world this month, we present a mono-linear version of that classic ZX-81 era game Zombies. You play the part of Captian Xiran and you must rid the land of the hideous Zombie horde. The zombies are both unbelievable strong (one touch or 'zombie hug' and you're zombie lunch) and incredibly stupid (they have no battle strategy at all, they simply home in on your position). They are also very short sighted, and this is your one advantage. The playing arena is dotted with many holes (white squares) and a zombie will die if it falls into one. You are free to move around the arena with Z, X, SHIFT and CTRL but you will also perish if you fall into a hole, so watch your step. The game ends when you die or you dispatch all the zombies.

The expanded listing is shown on the right. You'll need to compress it with the function key definition, shown below, to fit it all on one line.

```
 10 f=40
 20 MODE7
 30 b=HIMEM
 40 REPEATVDUTRUE-223*SG
    N(VPOS MOD23*POS MOD
    39*(3ANDRND))
 50 UNTILVPOS=24
 60 u=4^7
 70 FORv=u TOu+127STEP4
 80 !v=RND(20)+f*RND(22)
 90 NEXT
100 !u=475
110 REPEAT
120 w=v
130 REPEAT
140 v=(v+4)ANDNOT128
150 UNTILACSv?2
160 j=u=v
170 b?!v=0
180 !v=!v-j*(INKEY-98-IN
    KEY-67+f*(INKEY-2-IN
    KEYTRUE))+SGN(!uMODf
    -!v MODf)+f*SGN(!u-!
    v)
190 v?2=b?!v/255
200 b?!v=(1-v?2)*(90+2*j
    )
210 UNTILu?2OR!v=!u*(1+j
    )ORw=v
```

```
*KEY0 f=PA.+4:t=f:b=&F5:REP.c=(b<>&F5):?t=-?t*NOTc-58*
c:t=t-c:x=f?-1:FOR i=1TOx-4:b=?f:?t=b:f=f+1:t=t+1:N.:f
=f+4:U.f?-3=&FF:?t=&D:t?1=&FF:?(PA.+3)=t-PA.|
```

Mixed Bag

The following list contains 10 things that could be part of your computer system. Can you unscramble what they are?

1) COURTROOM LINO
2) MIX TORRID PATTERN
3) PARAMETER SET
4) ESPRESSO CONCORD
5) CINDERY MAKE-UP
6) CADDISH DRIVER
7) IDIOT GIVES RIDE
8) ABORTED CONE
9) FUNKY SECTION
10) SUPER ALMONDS

See next month's puzzle page for the solution.

And finally...

Rock fans (and insomniacs) may well be aware of the ITV night time magazine program called *Raw Power*, which is broadcast at the unheard of time of 3.30 on a Saturday morning. The relevance of this to *BBC Acorn User*? Well, if you watch right to the end, it seems that the camera man is none other than Ian Copestake! Where does he get the time from...

Grange Hill this week featured an A400/1 machine sitting quietly in a corner displaying its desktop. I'm afraid I'm not a regular watcher of the program so I don't know who was 'operating' it, but in the said scene, one teacher said to the other "All you have to do is boot it up". He followed this by pressing the RETURN key. Perhaps he'd written an IRQ routine to trap RETURN and make it generate SHIFT BREAK instead...

The loos in Acorn's Fulbourn Road offices have amazingly complicated instructions on the hot air drier, which describe in great detail the optimum way to dry your hands. Luckily there's a pull-towel on the wall, for the less technically minded...

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"For just 20 quid, Superior is offering a bargain here" ...Computer Shopper (Aug. 91)
"The most sophisticated of the speech programs" ...Special Solutions News - Acorn Computers (Autumn 91)
"Unquestionably the best buy" ...Micro User (July 91)

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AIR SUPREMACY

In this unique game, you can swap between air and ground/sea forces as the battle develops. Practise with the biplanes and tanks of 1918 Europe, the fighters and gunboats of the Pacific 1944, and the guided missile jets and desert tanks of the Gulf 1991. Then to 2150 and the final challenge!

"The sense of speed when flying around is excellent. Skimming along the ground in a stealth fighter is particularly fun" ...BBC Acorn User (Dec. 91)
"The ultimate dogfighting game - will take weeks of intensive play to complete - sinks its hooks into you and doesn't let go" ...Archimedes World (Dec. 91)

£24.95

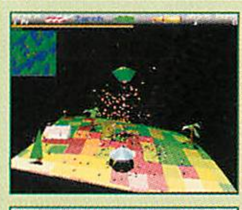


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The complete golfing game for 1 to 4 players, designed exclusively for the ARCHIMEDES. Realistic gameplay with a choice of six courses (St Andrews, The Belfry, Victoria and three Sea Palms courses), plus Driving Range and Practice Green. Full feature hole and course design and editing facilities.

"Technically brilliant, graphically excellent and incredibly playable. Worth going a fairway to buy" ...A & B Computing (now Archimedes World) (Dec. 90)

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ZARCH

David Braben, co-author of ELITE, has harnessed the speed and performance of the ARCHIMEDES to create a programming masterpiece. Nerve-tingling gameplay over a massive 3-dimensional landscape, with realistic area shading and accurate perspectives. Totally addictive.

"LANDER - which is supplied with the Acorn equipment - is fun; ZARCH is a game. ZARCH has a map, it has a string of bad guys and most importantly of all it has a series of challenges that develop as you play the game. And that's what gives it the quality possessed by the greatest games" ...BBC Acorn User (Nov. 91)

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CONQUEROR

Step into a tank of your choice and experience the thrill of controlling one of the most powerful land vehicles in the world, in a 3-dimensional landscape of roads, hills, villages, rivers and woodland. Choose the Arcade or Attrition games to develop your skills, and then ultimately the Strategy game, a full battle simulation with up to 16 tanks per side from American, German or Russian forces.

"What I want is a thinking man's shoot-em-up and CONQUEROR fits that bill" ...Micro User (May 88)
"A highly addictive tank simulator" ...Learning Curve Magazine (Aug. 90)

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HOSTAGES

The highly acclaimed, top-hit ATARI/AMIGA game, now reaches the ARCHIMEDES. Commando action and strategic planning as you rescue the hostages from the besieged embassy. Brilliant, realistic graphics and exciting gameplay...superb digitised sound effects and tunes...keyboard or mouse control.

"Graphically the game is very nice indeed. Your men run around, jump, leap, roll and die with great aplomb and the animation of them is excellent" ...A & B Computing (now Archimedes World) (Dec. 90)

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REPTON 3

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"REPTON 3 is an on-screen strategy program which children from seven upwards simply adore. No library of games software is complete without REPTON 3 - it is a must" ...BBC Acorn User (Nov. 91)

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MASTER BREAK

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"The digitised pictures and sounds are very nice indeed. The timer really adds atmosphere - I panicked the first time I tried to answer a black question...it's good to play on your own or with friends" ...Micro User (Mar. 91)

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SPEECH!, HOSTAGES, MASTER BREAK and the REPTON games are also available for the BBC MICRO/MASTER and ELECTRON computers. Please write to the address below or telephone for a full list of our BBC MICRO/MASTER (including MASTER COMPACT) and ELECTRON titles.



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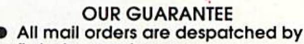
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